REPORT ON RUSSIA BY VICE ADMIRAL HYMAN G. RICKOVER, USN

HEARINGS

BEFORE THE

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REPORT ON RUSSIA BY VICE ADM. HYMAN G. RICKOVER, U.S. NAVY

TUESDAY, AUGUST 18, 1959.

WITNESS

VICE ADM. H. G. RICKOVER, U.S. NAVY

Mr. CANNON. We are honored by having with us today one of the most distinguished men of the Nation, the "Father of Nuclear Propulsion." The Nation would not be safe today—if it is safe—except for the contribution of Admiral Rickover in the adaptation of nuclear power to submarines and the utilization of atomic energy in both military and civilian enterprises. When he was assured that it was impossible to build a nuclear-powered submarine, he insisted that it could be done and he built the *Nautilus*, the first nuclear-powered submarine, and the Shippingport reactor on record time.

Admiral Burke is reported in this morning's newspapers as saying that Russia is building not only nuclear-powered submarines, but submarines equipped to fire both the equivalent of the POLARIS and the intercontinental ballistic missiles. In any future war the survival of our form of government, the destiny of world civilization may rest upon weapons initiated by Admiral Rickover. Now, he has rendered us another service. When the Russians were visiting us, he took in tow—I use a nautical phrase—Mr. Kozlov and escorted him about and showed him many critical features of our production. And later when Admiral Rickover was in Russia he in turn demanded that he see what the Russians were doing. That did not set well with them. They said, "Nyet."

They have just completed an icebreaker over there which will travel through ice 8 feet thick. It is powered by atomic energy, and he wanted to see the reactor, and they said, "The key is lost." He said, "Get the key." I trust the gentleman will pardon me for quoting him. As a matter of fact, I may be entirely wrong about it. He won his point as he always does. In my opinion, he is the outstanding American of the day. and the maintenance of the future peace of the world will devolve upon what he has accomplished and what we expect him to accomplish.

Admiral Rickover has a hobby. He is deeply interested in education and I shall now recognize him to discuss that subject, although I trust in that connection he will also discuss other features of the Russian problem.

You know, Admiral Rickover, education is highly essential. It is indispensable in a well-ordered world. But it is evolutionary; it takes time. The sands are running out. We may not have much time left and so I have the honor now to introduce to you Admiral Rickover of the U.S. Navy.

Admiral RICKOVER. Thank you for your kind and gracious words. My visit to Russia and Poland confirmed my belief that the real race we are in with communism is to see whose educational system best prepares youth for the world of modern science and technology. I had the opportunity to talk to the Ministers of Education in both Russia and Poland, and with other educational officials. came away from this visit feeling that the Russian educational system, in particular, has been designed more efficiently to serve their national and ideological objectives than our school system serves the objectives of our democratic capitalism. The number of Russians graduating from their 10-year schools is about the same as the number of Americans graduating from our high schools, but the Russian children are at least 2 years ahead of the American high school graduates in sound, basic education. By that I mean mathematics, the sciences, mastery of the mother tongue, knowledge of their own classical literature and that of major foreign nations, foreign languages, and history—though their history study is colored by Marxist doctrine.

BACKGROUND OF ADMIRAL RICKOVER IN EDUCATION

Mr. CANNON. Before you continue, may I ask you, for the purposes of the record, to state your qualifications for talking about education?

Admiral RICKOVER. As to my qualifications: I graduated from grammar school, high school, and the U.S. Naval Academy; I took 2 years of postgraduate engineering and received a M.S. from Columbia University, and I spent another year taking a graduate course in nuclear physics and reactor engineering at Oak Ridge.

I was instrumental in setting up the Oak Ridge School of Reactor Technology. I also assisted in setting up the first nuclear engineering course at the Massachusetts Institute of Technology and I am presently on an advisory committee to Princeton University to help them revise their mechanical engineering curriculum. It is true, however, that on the basis of these qualifications, I would not be permitted to teach even a course in "general science" in any grade of the District of Columbia school system, or anywhere else in the United States for that matter. That, of course, would be true also of such eminent educators as Dr. Killian, president of MIT, who was the President's scientific adviser, President Griswold of Yale, President Pusey of Harvard, or President Goheen of Princeton.

From that standpoint and the judgment of the National Education Association I am completely unqualified to talk about education to your committee, sir. I was forced into the educational problem because I saw the poor products of our educational system. That is what got me started. I am a customer for the products of our schools. I tried to get people to help me do a job in nuclear power development, and I found the product of our schools quite unsatisfactory, so I set out to find the reasons.

DISCUSSION OF "LIBERAL" EDUCATION

Admittedly, comparisons between different national systems of education are not easy to make. But one can compare what each achieves in those subjects which are traditionally regarded as making up a course in "liberal" education—that is, the humanities and the

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sciences. The word "liberal" derives from the word "free." It goes back to antiquity where these subjects were considered suitable for the education of freemen, as contrasted with vocational subjects which were taught slaves so that they would be "useful" to their masters.

A liberal education tends to liberate the mind from the narrow confines of personal observation through one's senses. The subjects which make up a liberal education extend our knowledge of the world beyond what we would know through personal experience. Thus history familiarizes us with the past; anthropology, economics, foreign languages and literatures with distant peoples and lands; mathematics and the sciences with the world of nature; mastery of the mother tongue gives us the means for further self-education through books and enables us to communicate our thoughts through the written word. The enhancement of man's comprehension of the world enriches his personal life. In a democracy it has the further invaluable result of making him a better citizen because knowledge and ability to think independently will enable him to make wiser decisions when he chooses among candidates for public office as well as when he voices an opinion on important national issues.

A liberal education also lays the foundation of knowledge upon which professional education is built. A nation which induces large numbers of its children to complete a course in liberal education will have a huge pool of youth trained in the fundamentals, the best of whom may then continue their education and become trained professionals. Modern technologies need large numbers of trained professionals. Obviously, if more children go through preprofessional general education courses, the chances are better that among them there will be a greater number of talented youth who will become first-rate professional people.

Russia, through her 10-year schools, produces a much larger talent pool than we obtain through our public school system; fewer talented Russian youth are apt to waste their potentialities in vocational courses when they could become scientists, engineers, writers, historians, or teachers. Since all Russian children tackle academic subjects, it follows that all who show promise in one or another area of knowledge will be discovered early. In the United States it is quite possible that, left to his own devices, a potentially talented child may squander his best learning years on easy know-how courses which require no homework, but which earn him the same credit toward a high school diploma as academic subjects. How can we discover his potentialities if he is not required to try his hand at the basic subjects which constitute the foundation for future professional education?

Too many people here think of a liberal education as a luxury, something of no immediate usefulness. It is true that, except for the basic elementary skills of "reading, writing, and 'rithmetic" which everyone needs today, a liberal education does not in itself prepare one to earn a living. For this one needs in addition some specialized skill—this can be manual or intellectual, that is, vocational or professional. This specialized skill should properly come after one has completed his general education and through it has discovered his particular talents. To allow a child to choose typewriting instead of physics, machine shop instead of history or a foreign language, is to

let a minor make a decision which will affect the whole course of his future life; a decision he is too young to make intelligently. In other modern democracies, vocational subjects are to some slight extent taught in schools attended by children who are not academically talented, but they are never considered a substitute for general education. Here we stop teaching basic subjects to slow learners too soon; we shift them too early from education into training.

DISTINCTION BETWEEN EDUCATION AND TRAINING

Education, to me, means development of the mind; it consists in transmission of the fundamentals of systematic knowledge and in development of the ability to utilize this knowledge for the solving of the myriad of problems which everyone encounters in his life. In a good school, students are constantly asked to apply what they have learned to new situations—this is what traditional examinations and tests are for. Thus, abstract knowledge is used in a practical way which prepares one for adult life when real problems must be solved rationally. The process of supplying both basic knowledge and ability to make practical use of this knowledge is properly termed "education."

We must distinguish education from training, which is a process whereby youth acquire certain useful and socially approved habits; it is "life adjustment," adjustment to the "peer" group, training in manners, good grooming and how to dress; it is miscellaneous know-how such as how to shop, budget, use the telephone, cook, drive a car; how to occupy oneself during one's leisure time as by flycasting or baton twirling; it is the acquiring of assorted vocational skills in such things as typewriting, woodshop, machine shop, printshop. As in all human activities, the mind comes into play when one is trained in such skills and habits, but the mind does not develop through practicing manual skills or following habit. Mastery of the English language has quite a different effect on one's intellectual capacities from that which comes through mastery of typewriting. Knowledge of history increases one's comprehension of world events, whereas home-making or driver training—necessary and useful as they may be—do not. In most other countries training is largely left to home, to church and to learning through living or on the job—the schools concentrate on education.

It is in education—that is in transmitting the fundamentals of knowledge, in developing the ability to think through sharpening the child's intellectual tools—that we fall down. Too much of our so-called education is mere training in various kinds of know-how.

COMPARISON OF EDUCATION IN UNITED STATES AND EUROPE

In genuine education, our schools have always been behind those of northern and western Europe; but in the past our schools at least had the advantage of being free while those of Europe were not. For some time education up to age 18 in all advanced European nations has been either entirely free or quite inexpensive; even professional education at universities is inexpensive—certainly far less expensive than in this country. In Russia, of course, all education is free, and university students are even paid room and board and given a small amount of pocket money besides.

In genuine education, our schools are now also behind those of Russia. But while we were not menaced if Swiss or Dutch children were much better educated than American children, we may be endangered if Russian children continue to be better educated than ours. Also, in the past we could comfort ourselves by dwelling on the fact that fewer Europeans obtained a secondary education than Americans, but we cannot do so in the case of Russia. Not long ago a noted educator remarked that though he did not know what percentage of Russian children completed the 10-year school, it must certainly be a small one. This is not so. I do not know the exact percentage either, but in numbers the Russian graduates are about equal to our high school graduates.

EDUCATION IN RUSSIA

A publication of the U.S. Office of Education issued in 1958 gives 1.6 million as the number of Russians graduating from the 10-year school in 1957; that same year 1,458,000 graduated from American high schools.

We should be completely unrealistic if we equated the education received by these 1.6 million Russians with that of the about 1.5 million Americans of whom a majority did not even take a college preparatory course. Our high school diploma tells us nothing about the scholastic achievements of its possessor. We do know something, however, of what the Russian 10-year school graduate must know to pass his "maturity" examination and receive a diploma. Just for the sake of the record, let me read you a number of paragraphs from an official U.S. Department of Health, Education, and Welfare publication entitled "Final Examinations in the Russian 10-Year School." This pamphlet was published in October 1958. I will quote from it:

> During part of May and June of each year, Soviet school boys and girls who have completed the regular 10-year school program face an experience which is crucial to their future careers: a final examination in each of the major subjects which they have studied during the years behind them. These examinations have been required of all graduating students everywhere in the U.S.S.R. since June 1944, when the Soviet Government issued a decree, "On Measures for Improving the Quality of Instruction in the Schools." This decree called for the present examination system to be applied throughout the federal union. The examinations are made up by the ministries of education in the various Soviet republics, and are submitted by them to the individual district school authorities.
>
> Although the actual number of subjects and the kinds of questions have varied over the years, the type, form, and purpose of the examinations have been constant. The examination pamphlets are published annually a few months before exam time, * * * and are issued by the state publishing house. The principal aims of these final tests are stated to be to verify the amount of knowledge acquired by the 10-year students, and to reveal "their development, independence of judgment, and ability to relate knowledge with life—theory with practice."
>
> The exams manifestly reflect a principal pedagogical effort to have pupils master a prescribed amount of knowledge from textbooks, other required readings and practical work. The resulting examination processes require a pattern of questions and problems which respond to the officially set achievement levels but which vary but little from one year's examinations to the next.

Obviously, the American high school diploma as such cannot be compared with the Russian "maturity" diploma. We have indeed in the United States a kind of standard national test—conducted by a private organization, the College Entrance Examination Board—which is taken by a minority of the high school graduates who enter college. There are two specific parts to this test: the latest figures

I was able to obtain from the Board show that in 1956 the scholastic aptitude test was taken by about 240,000 or 31 percent of such students—many of these coming from the private college preparatory schools; the achievement tests were taken by 115,000 or less than 15 percent. In comparing these figures with the 1,600,000 Russian students who graduated in 1957, it must be remembered that in recent years the population gap between the United States and Russia has narrowed. Although Russia now has a total population one-sixth greater than ours, her total school-age population is about equal to ours at present because of her low wartime birthrate.

The scholastic aptitude test measures innate ability rather than concrete achievement in school and cannot be compared with the examination taken by the Russian 10-year school graduates. The achievement tests are comparable, but one must remember that they are for only three subjects with the choice left to the student himself, whereas the Russians have no choice and must pass an examination in seven academic subjects—Russian language and literature, a foreign language, algebra, geometry, physics, chemistry, and history. The Russian examination therefore covers a much broader field of knowledge than our college board achievement tests.

EXAMPLES OF RUSSIAN EXAMINATIONS

To give you an idea how tough these Russian exams are, I ask your permission to place them in the record. I hope that American parents and teachers will look at these exams and realize that our children are being shortchanged. I hope they become angry enough to force their school boards to improve the curriculum, to improve the teaching, and to stop wasting the time of our children with fun subjects and other matters unrelated to education. I hope this set of examinations definitely shows them that our schools are not the best in the world.

Mr. CANNON. It will be included in the record at this point.

(The examinations referred to follow:)

FINAL EXAMINATIONS IN THE RUSSIAN 10-YEAR SCHOOL

(Taken from Bull. No. 6, dated October 1958, U.S. Department of Health, Education, and Welfare, Office of Education, International Educational Relations)

ALGEBRA

1. a. The types of combinations and permutations. Number of permutations of m elements taken n at a time. Number of permutations of m elements.
b. Problem or example.
c. Quadratic equations. Complete and incomplete quadratic equations. Solution of quadratic equations of the form $x^2+px+q=0$.
2. a. Combinations. Number of combinations of m elements taken n at a time. Equality: $Cm^n=Cm^{m-n}$
b. Problem or example.
c. Investigation of the roots of a quadratic equation by means of its discriminant and coefficients.
3. a. Product of binomials differing only in their second term.
b. Problem or example.
c. Solution of quadratic equations of the form $ax^2+bx+c=0$.
4. a. Formula of Newton's binomial (derivation).
b. Problem or example.
c. Expression of the sum and product of the roots of a quadratic equation through its coefficients.

5. a. Equality of coefficients of terms equally distant from the beginning and end of Newton's binomial expansion. Common term of the formula of Newton's binomial. Sum of binomial coefficients.
b. Problem or exa.nple.
c. Expansion of the trinomial of second degree into linear factors.
6. a. Imaginary numbers. Complex numbers. Modulus of a complex number. Condition of a complex number equalling zero. Condition of two complex numbers being equal.
b. Problem or example.
c. Exponential function. Properties of the exponential function and its graph.
7. a. Addition and subtraction of complex numbers in algebraic form.
b. Problem or example.
c. Logarithmic function, its properties, and graph.
8. a. Multiplication and division of complex numbers in algebraic form.
b. Problem or example.
c. Arithmetic progression. Formula of the sum of terms of an arithmetic progression.
9. a. Geometrical interpretation of complex numbers. Trigonometric form of complex numbers.
b. Problem or example.
c. Sum of terms of a geometric progression diminishing without bound.
10. a. Investigation of the quadratic trinomial (the discriminant of the trinomial being positive).
b. Problem or example.
c. Logarithm of a product.
11. a. Inequalities. Fundamental properties of inequalities. Addition and subtraction of inequalities.
b. Problem or example.
c. Logarithm of a quotient.
12. a. Equivalent inequalities. Theorem concerning the equivalence of inequalities with the addition of the same number to both sides of the inequality. Corollary.
b. Problem or example.
c. Logarithm of a power and of a root.
13. a. Theorem concerning the equivalence of inequalities with multiplication and division of both sides of the inequality by positive and negative numbers.
b. Problem or example.
c. Logarithms to the base 10 and their properties.
14. a. Solution of first-degree inequalities with one unknown. Solution of a system of first-degree inequalities with one unknown.
b. Problem or example.
c. Linear function and its graph.
15. a. Investigation of first-degree equations with one unknown.
b. Problem or example.
c. Formula of any required term of an arithmetic progression.
16. a. Investigation of a system of two linear equations with two unknowns.
b. Problem or example.
c. Direct proportional relationship and its graph.
17. a. Investigation of the quadratic trinomial (the discriminant of the trinomial being negative or equal to zero).
b. Problem or exercise.
c. Raising to a power with natural number exponent of a product, fraction, or power.
18. a. Solution of a second-degree inequality with one unknown.
b. Problem or example.
c. Extracting a root from product, fraction, and power.
19. a. Bézout's theorem and its corollaries.
b. Problem or exercise.
c. Inverse proportional relationship and its graph.
20. a. Solution of binomial equations of the third, fourth and sixth degrees.
b. Problem or exercise.
c. Geometric progression. Formula of any required term of the geometric progression.
21. a. Solution of trinomial equations.
b. Problem or exercise.
c. Sum of the terms of a geometric progression.

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1. a. Properties of the faces and diagonals of a parallelepiped.
b. Property of obtuse angles of a convex polyhedral vertex.
c. Problem.
2. a. Properties of parallel sections of a pyramid and the relationship between the areas of parallel sections of two pyramids having equal altitudes.
b. Theorem concerning the line of intersection of two planes, of which one cuts a straight line parallel to the other.
c. Problem.
3. a. Lateral and total surfaces of inclined and right prisms.
b. Parallel planes. Sign of two planes being parallel.
c. Problem.
4. a. Lateral and total surfaces of a right pyramid.
b. First and second signs of similarity of triangles.
c. Problem.
5. a. Lateral and total surfaces of a right truncated pyramid.
b. Theorem concerning the segments of parallel straight lines confined between parallel planes.
c. Problem.
6. a. Volume of a rectangular parallelepiped.
b. Property of obtuse angles of a trihedral vertex.
c. Problem.
7. a. Lemma concerning the equality of magnitude of inclined and right prisms.
b. Signs of perpendicularity of a straight line to a plane.
c. Problem.
8. a. Volume of a right parallelepiped.
b. Theorems concerning the perpendicular and slopes with equal and differing projections.
c. Problem.
9. a. Volume of an inclined parallelepiped.
b. Theorem concerning three perpendiculars. Converse theorem.
c. Problem.
10. a. Volume of a prism (trigonal and polygonal).
b. Theorem concerning a plane perpendicular to one of two parallel straight lines.
c. Problem.
11. a. Volume of a pyramid (trigonal and polygonal).
b. Theorem concerning a straight line perpendicular to one of two parallel planes.
c. Problem.
12. a. Volume of a truncated pyramid.
b. Theorem concerning two planes perpendicular to the same straight line.
c. Problem.
13. a. Right polyhedrons.
b. Bihedral angle. Linear angle. Equality and inequality of bihedral angles. Theorem: "To equal bihedral angles correspond equal linear angles." Converse theorem.
c. Problem.
14. a. Surfaces of revolution. Cylindrical surface. Right circular cylinder. Lateral and total surfaces of a cylinder.
b. Lemma concerning the similarity of triangles.
c. Problem.
15. a. Conical surfaces. Right circular cone. Lateral and total surfaces of a cone.
b. Perpendicular planes. Sign of perpendicularity of two planes.
c. Problem.
16. a. Lateral and total surfaces of a truncated cone.
b. Theorem concerning a straight line which is perpendicular to one of two mutually perpendicular planes and which has a common point with the other plane; its corollary.
c. Problem.
17. a. Volume of a cylinder.
b. Intersecting straight lines. The angle of intersection of two straight lines. The shortest distance between two intersecting lines.
c. Problem.

18. a. Volume of a cone.
b. Determining the length of the circumference. Theorem concerning the constant relationship between the length of the circumference and the diameter.
c. Problem.
19. a. Volume of a truncated cone.
b. Pythagorean theorem.
c. Problem.
20. a. Sphere (definition). Section of a sphere by a plane. Theorems concerning a plane passing through the denter of a sphere and concerning great circle circumferences.
b. Sign of a straight line and a plane being parallel.
c. Problem.
21. a. Plane touching a sphere (definition). Theorems concerning a plane touching a sphere (direct and converse).
b. Areas of a parallelogram and of a triangle.
c. Problem.
22. a. Lemma concerning the lateral surfaces of a cone, truncated cone, and cylinder.
b. Angle between a straight line and a plane.
c. Problem.
23. a. Surfaces of a spherical segment, of a belt, and of a sphere.
b. Area of a circle. Formula for the area of a circle.
c. Problem.
24. a. Lemma concerning the volume of bodies resulting from the rotation of a triangle.
b. Property of the bisector of an internal angle of a triangle.
c. Problem.
25. a. Volumes of a spherical sector and of a sphere.
b. Theorem concerning the intersection of two parallel planes by a third.
c. Problem.
26. a. Volume of a spherical segment.
b. Theorem concerning angles with mutually parallel sides.
c. Problem.

HISTORY OF THE U.S.S.R.

1. a. Russia's transition to imperialism. Special features of imperialism in Russia.
b. The first five-year plan.
2. a. V. I. Lenin's struggle for the creation of a revolutionary workers' party during 1900–1903. (The Leninist "Spark (*Iskra*)". Preparing a Party of a new type. II Congress of the RSDLP;[1] its significance.)
b. The universal-historical significance of the Great October Socialist Revolution. The Party of Bolsheviks headed by Lenin—organizer of the victory of the socialist revolution.
3. a. Causes and development of the Russo-Japanese war. Its character. Conditions of the Portsmouth peace.
b. The second five-year plan.
4. a. Causes of the revolution of 1905–07. "Bloody Sunday," January 9, 1905. Protest strikes in the country.
b. Causes of the civil war and of the intervention against the Soviet land. Role of international imperialism in organizing the intervention and civil war.
5. a. III RSDLP Congress on the nature, motivating forces, and perspectives of the first Russian revolution.
b. Rout of the German-Fascist troops near Moscow in the fall of 1941.
6. a. The December armed uprising of 1905. V. I. Lenin's evaluation of this uprising.
b. The universal-historical significance of the Soviet Republic's victory in the civil war. The Communist Party, organizer of this victory.
7. a. The nature of the agrarian reform of Stolypin and its collapse.
b. The Soviet Republic in the ring of (military) fronts of 1918. The Patriotic War of workers and peasants of the Soviet land against the foreign invaders and White Guard forces in the fall of 1918.
8. a. The beginning of a new revolutionary upsurge. The Lenskii execution.
b. The beginning of the Great Patriotic War. Mobilization of the forces of the Soviet people for the fight against the enemy.

[1] Russian Social-Democratic Labor Party.

9. a. Causes and character of World War I.
b. The universal-historical significance of the 1905–7 revolution.
10. a. Causes, character, and moving forces of the February bourgeois-democratic revolution in Russia in 1917.
b. The first campaign by the Entente and its rout.
11. a. The April theses of V. I. Lenin and their historical significance.
b. The XVIII AUCP(b) Congress on the basic economic task of the U.S.S.R.
12. a. The July 1917 events in Petrograd. The VI Congress of the Party and its significance.
b. The fourth five-year plan.
13. a. The October armed uprising in Petrograd. V. I. Lenin—leader of the armed uprising.
b. Councils of workers' deputies in 1905 and their significance.
14. a. Organization of the Soviet state. (Historical significance of the establishment of the dictatorship of the proletariat in Russia. Collapse of the old state apparatus. Creation of the Soviet state apparatus.)
b. Transition to the policy of mass collectivization and liquidation on this basis of the kulaks as a class.
15. a. The triumphant spread of Soviet rule after the October uprising in Petrograd. The III All-Russian Congress of Soviets.
b. The universal-historical significance of the victory of the Soviet Union in the Second World War.
16. a. Liberation by Soviet power of the subjugated peoples of Russia in 1917. "The Declaration of the Rights of the Nationalities of Russia."
b. The second campaign of the Entente and its rout.
17. a. Soviet Russia's struggle to leave the imperialist war. Conclusion of the Brest peace.
b. Causes of the defeat of the 1905–7 revolution in Russia.
18. a. The policy of war communism. Economic and cultural construction during the civil war years.
b. The Bolsheviks' struggle during the years of reaction (1907–1910) against the liquidators, anti-convocationists, and Trotskyites.
19. a. X Congress of the Party. Transition to the new economic policy.
b. The creation of the Red Army.
20. a. The universal-historical significance of the formation of the U.S.S.R.—the first multi-national socialist state in the world. The first constitution of the U.S.S.R.
b. Rout of the counter-revolutionary rebellion of Kornilov.
21. a. The last public addresses of V. I. Lenin. Lenin's elaboration of the program for transforming economically backward Russia into a leading, powerful socialist state.
b. The third campaign of the Entente and its rout.
22. a. XIV Party Congress—as the congress of socialist industrialization.
b. The heroic struggle of the Soviet partisans during the Great Patriotic War.
23. a. XV AUCP(b) Congress—as the congress of agricultural collectivization. Defeat of the anti-Party Trotskyite-Zinov'evite bloc.
b. The Bolshevik newspaper *Pravda*. The Bolsheviks' activity in the IV State Duma.
24. a. The U.S.S.R. Constitution of 1936. Its universal-historical significance.
b. The Leninist plan of onset toward socialist construction. Development of the socialist revolution in the villages in 1918. *Kombedy*.
25. a. The U.S.S.R.'s fight for peace and security on the eve of the Second World War. Reunion of Western Ukraine with the Ukranian SSR and of Western Belorussia with the Belorussian SSR. Admission of Lithuania, Latvia, and Estonia into the composition of the Soviet Union.
b. The Leninist plan for the electrification of Russia.
26. a. The radical turning point of the Great Patriotic War.
b. The armed uprising in Moscow in October–November 1917.
27. a. The great advance of the Soviet Army in 1944 and its liberation of European countries abroad from the Hitlerite invaders.
b. II Congress of Soviets and its decrees on peace and land. Formation of the Soviet government headed by Lenin.
28. a. The international situation after the Second World War. The U.S.S.R. in the struggle for the preservation and strengthening of peace.
b. The mass peasant movement; the uprising on the battleship "Potemkin."
29. a. Directives of the XX Party Congress on the sixth five-year plan for developing the U.S.S.R. economy and the Soviet people's struggle to fulfill them.
b. The capitulation of imperialist Japan in 1945.

30. a. The XX Party Congress and its historical significance.
b. The further upsurge of science and culture in the U.S.S.R. during the post-war period.

PHYSICS

1. a. The first and second laws of Newton.
b. Laboratory work: determining the internal resistance of a source of current.
2. a. The third law of Newton. The law of conservation of momentum. Reactive motion in technology.
b. Laboratory work: determining the specific resistance of a conductor.
3. a. Curvilinear motion of a body. Centripetal acceleration (without derivation of formula). Rotary mechanisms and their utilization in industry and agriculture.
b. Solving a problem based on the laws of (electric) current of the type of problem No. 861 [2] and giving an explanation of the solution.
4. a. Fundamental propositions of the molecular-kinetic theory and its experimental bases. Brownian movement. Movement of molecules of gases, liquids, and solids. Interaction of molecules.
b. Solving a problem on the topic "work done by an electric current" of the type of problem No. 933 [2] and giving an explanation of the solution.
5. a. Derivation of the equation of the gaseous state. Examples of utilization of gas laws in technology.
b. Solving a problem based on the laws of electrolysis of the type of problem No. 973 [2] and giving an explanation of the solution.
6. a. Law of conservation and transformation of energy in mechanical and heat processes.
b. Solving a problem based on the laws of illumination of the type of problem No. 1121 [2] and giving an explanation of the solution.
7. a. Work done by the expansion of a gas. The heat engine. Efficiency of a heat engine.
b. Laboratory work: determining the optical power of a lens.
8. a. Electric charge. Electric field. Coulomb's Law. Units of quantity of electricity.
b. Solving a problem based on the application of the law of conservation and transformation of energy in mechanical and heat processes of the type of problem No. 565 [2] and giving an explanation of the solution.
9. a. Strength of an electric field. Lines of force. Homogeneous field. Conductors and dielectrics in an electric field. Examples of utilization of dielectrics.
b. Solving a problem based on computing the specific heat capacity of a substance or the temperature of a heated body of the type of problems No. 545 [2] or No. 547 [2] and giving an explanation of the solution.
10. a. Work done by transfer of charge in an electric field. Difference of potential. Units of difference of potential.
b. Laboratory work: experimental testing of the Boyle-Mariotte Law.
11. a. Electric capacity. Units of electric capacity. Condensers and their application.
b. Solving a problem based on the equation of the gaseous state of the type of problem No. 641 [2] and giving an explanation of the solution.
12. a. Conditions for the existence of a current. Nature of electric current. Nature of electric current in metals. Emission of electrons by incandescent bodies. Current in electrolytes and gases.
b. Laboratory work: determining the coefficient of surface tension of water.
13. a. Series connection of conductors. Derivation of the formula for the common resistance of conductors connected in series. Additional resistance in voltmeters. Application of series connections of conductors in technology.
b. Solving the problem concerned with melting and boiling of the type of problem No. 721 [2] and giving an explanation of the solution.
14. a. Parallel connection of conductors. Derivation of the formula for common resistance in the case of a parallel connection of conductors. Shunts for ammeters. Application of parallel connections of conductors in technology.
b. Solving a problem on the topic "the work of steam and gas" of the type of problem No. 750 [2] and giving an explanation of the solution.

[2] Given in Znamenskii, P. A., ed. *Sbornik voprosov i zadach po fizike* (Manual of questions and problems in physics), Moscow, State Publishing House for Teaching and Pedagogical Materials. (See the appendix at the end of the examinations section.)

15. a. Electromotive force of a source of current. Ohm's Law for the entire circuit. Series and parallel connections of sources of current.

b. Solving a problem based on the second law of Newton of the type of problem No. 110 [2] and giving an explanation of the solution.

16. a. The Joule-Lenz Law. Thermal current.

b. Solving a problem based on the second law of Newton of the type of problems No. 102 [2] or No. 121 [2] and giving an explanation of the solution.

17. a. Current in rarefield gases. Cathode rays and their properties. X-rays and their application.

b. Solving a problem based on the third law of Newton of the type of problem No. 71 [2] and giving an explanation of the solution.

18. a. Magnetic field of a direct current and of a coil with current. Action of the magnetic field on current. Strength of the magnetic field.

b. Solving a problem concerned with rotary motion of the type of problem No. 482 [2] and giving an explanation of the solution.

19. a. Iron in a magnetic field. Introduction of a magnetic field. Magnetic flux. The electromagnet. The electromagnetic field.

b. Solving a problem concerned with rotary motion of the type of problem No. 472 [2] and giving an explanation of the solution.

20. a. Electromagnetic induction. Conditions determining the magnitude of the electromotive force of induction. Lenz's Law.

b. Solving a problem based on the law of universal gravitation of the type of problems No. 494 [2] or No. 495 [2] and giving an explanation of the solution.

21. a. The phenomenon of self-induction. Inductivity. The unit of inductivity.

b. Solving a problem concerned with computing the work involved in raising a body.

22. a. The generator of alternating current. Period, frequency, and phase of alternating current. Principle of the functioning of a transformer.

b. Solving a problem on the topic "mechanical energy" of the type of problem No. 199 [2] and giving an explanation of the solution.

23. a. Wave contour. Transformation of energy in a wave contour. Obtaining non-dampening vibrations.

b. Solving a problem on the topic "mechanical energy" of the type of problem No. 218 [2] and giving an explanation of the solution.

24. a. Invention of the radio by A. S. Popov. Electrical resonance. Schematics of the detector and the simplest tube receivers.

b. Solving the problem on the topic "resolution of parallel forces" of the type of problem No. 314 [2] and giving an explanation of the solution.

25. a. Phenomena of reflection and refraction of light. Index of refraction. Complete internal reflection of light. Examples of application of these phenomena.

b. Solving a problem concerned with finding the center of gravity of bodies of the type of problem No. 301 [2] and giving an explanation of the solution.

26. a. Lenses. Derivation of the formula of the lens. Optical power of a lens. Obtaining images with the aid of a lens.

b. Solving a problem based on the application of the law of equality of work in mechanisms of the type of problem No. 346 [2] and giving an explanation of the solution.

27. a. The eye. The angle of vision. Optical instruments. The paths of rays in the microscope and in the telescope.

b. Laboratory work: determining the efficiency of a simple machine.

28. a. Dispersion of light. The visible, the infra-red, and the ultraviolet portions of the spectrum. Examples of utilization of the invisible portions of the spectrum.

b. Solving a problem concerning levers of the type of problem No. 328 [2] and giving an explanation of the solution.

29. a. Continuous and line spectra. The absorption spectrum. The spectroscope. Special analysis and its application.

b. Solving a problem concerned with the interaction of charged bodies of the type of problems No. 771 [2] or No. 780 [2] and giving an explanation of the solution.

30. a. The photoelectric effect. Stoletov's work on the photoelectric effect. The concept of quanta. Photoelements and their application.

b. Solving a problem concerned with the heat action of a current of the type of problem No. 948 [2] and giving an explanation of the solution.

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[2] Given in Znamenskii, P. A., ed. *Sbornik voprosov i zadach po fizike* (Manual of questions and problems in physics), Moscow, State Publishing House for Teaching and Pedagogical Materials. (See the appendix at the end of the examinations section.)

31. a. Structure of the atom—the electron envelope and the nucleus. Emission and absorption of energy by the atom.

b. Solving a problem based on the laws of vibration of pendulums of the type of problem No. 502 [2] and giving an explanation of the solution.

32. a. Structure of the nucleus of the atom. Fission of a uranium atom. Chain reaction. Examples of utilization of atomic energy for peaceful purposes.

b. Solving a problem of the type of problem No. 526 [2] and giving an explanation of the solution.

CHEMISTRY

1. a. Oxides; their classification and chemical properties.

b. Problem: to compute the release of the product of a reaction in terms of percent of the theoretically possible, if the quantity of the initial substances and the quantity of the obtained product are known (example: problem No. 13—113 [3], No. 13—137 [4]).

2. a. Bases; their chemical properties; the most important bases and their role in national economy.

b. Problem: to prepare a certain quantity of a solution of given percent concentration.

3. a. Acids; their chemical properties.

b. Problem: to determine with the aid of characteristic reactions each of two furnished organic substances.

4. a. Salts; their chemical properties.

b. Problem: to compute the weight of the product of a reaction, if a certain quantity of initial substance, containing a given quantity of impurities, was used for it.

5. a. Characteristics of the group of alkaline metals.

b. Problem: to obtain and collect carbon dioxide; to prove experimentally that the obtained gas is carbon dioxide.

6. a. Characteristics of the group of halogens.

b. Problem: to obtain hydrate of aluminum oxide and to perform the reactions characterizing its properties.

7. a. Application and production of sulphuric acid by the contact method.

b. Problem: to compute the volume of a gas required for a reaction with a certain volume of another gas (Example: problem No. 5–47 [3], No. 12–94 [4]).

8. a. The periodic law and the periodic system of elements of D. I. Mendeleev.

b. Problem: to perform the reactions characterizing the chemical properties of acetic acid.

9. a. Application and production of ammonia.

b. Problem: to obtain an assigned substance by an exchange reaction and to separate it from the mixture. To compute according to the reaction equation what quantity of each of the initial substances is required for obtaining the indicated quantity of the product.

10. a. The most important phosphorus and nitrogen fertilizers, their composition, properties, and the chemical reactions involved in obtaining them.

b. Problem: to compute the weight of the product of a reaction, if certain amounts of initial products in the form of solutions of certain percent concentration have been used for it.

11. a. Physical and chemical properties of metals.

b. Problem: to prepare a certain quantity of a solution of indicated percent concentration.

12. a. Application of and methods of obtaining caustic soda.

b. Problem: to perform the reactions confirming the qualitative composition of a furnished inorganic substance and to find the percentage content within it of one of the elements on the basis of the formula of this substance.

13. a. Characterization of the group of alkaline earth metals.

b. Problem: to determine with the aid of characteristic reactions each of three furnished inorganic substances.

14. a. The oxide and the hydrate of the oxide of calcium; their physical and chemical properties, application, and methods of obtaining them.

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[2] Given in Znamenskii, P. A., ed. *Sbornik voprosov i zadach po fizike* (Manual of questions and problems in physics), Moscow, State Publishing House for Teaching and Pedagogical Materials. (See the appendix at the end of the examinations section.)

[3] Given in Gol'farb IA. L. *and* Smorgonskii, L. M. *Zadachi i uprazhneniia po khimii* (Problems and exercises in chemistry), 1950–1956 editions, Moscow, State Publishing House for Teaching and Pedagogical Materials.

[4] Idem., 1957 edition.

(See the appendix at the end of the examinations section. Problems have been selected from the 1957 edition only.)

b. Problem: to compute the volume of a gas required for a reaction with a certain volume of another gas (Example: problem No. 5–47 [3], No. 12–94 [4]).

15. a. The hardness of water and methods of eliminating it.

b. Problem: to compute what quantity of an assigned substance is obtained in a reaction, if the quantity of each of the initial substances is known, and one of the substances is taken in excess (Example: problem No. 3–85 [3], No. 4–63 [4]).

16. a. Aluminum, its physical and chemical properties.

b. Problem: to compute the volume of a gas obtained from a given quantity of the initial substance, containing an indicated quantity of impurities. (Example: problem No. 9–15,[3] No. 10–14 [4]).

17. a. Application of and methods of obtaining aluminum.

b. Problem: to perform the reactions characterizing the chemical properties of an unsaturated hydrocarbon.

18. a. Iron, its physical and chemical properties.

b. Problem: to compute the weight of the product of a reaction if certain quantities of initial substances in the form of solutions of certain percent concentration were used for it.

19. a. Production of pig-iron.

b. Problem: to compute the volume of a gas obtained from a given quantity of the initial substance containing an indicated quantity of impurities. (Example: problem No. 9–15,[3] No. 10–14 [4]).

20. a. Production of steel.

b. Problem: to perform the reactions characterizing the chemical properties of formaldehyde.

21. a. Corrosion of metals and measures for combating it.

b. Problem: to obtain a substance by way of an exchange reaction and to separate it from the mixture. To compute according to the equation of the reaction what quantity of each of the initial substances is required for obtaining the indicated quantity of the product.

22. a. Theory of the structure of organic compounds of A. M. Butlerov.

b. Problem: to obtain and collect ammonia; to prove experimentally that the gas obtained is ammonia.

23. a. Methane, its structure, physical and chemical properties, application.

b. Problem: to perform the reactions confirming the qualitative composition of a furnished inorganic substance and to compute on the basis of its formula the percent content within it of one of the elements.

24. a. Ethylene, its structure, physical and chemical properties, application.

b. Problem: to perform the reactions confirming the qualitative composition of a furnished inorganic substance and to find on the basis of its formula the percent content within it of one of the elements.

25. a. Acetylene, its structure, physical and chemical properties, application.

b. Problem: to obtain and separate oxygen, to prove experimentally that the gas obtained is oxygen.

26. a. Benzol, its structure, physical and chemical properties, application.

b. Problem: to perform the reactions characterizing the chemical properties of glucose.

27. a. Petroleum, its composition and properties. The most important petroleum products. Industrial processing of petroleum.

b. Problem: to obtain a small quantity of hydrochloric acid and to perform on it qualitative reactions.

28. a. Ethyl alcohol, its structure, physical and chemical properties, and applications.

b. Problem: to compute what quantity of an assigned substance is obtained in a reaction, if the quantity of each of the initial substances is known, and one of them is taken is excess (Example: problem No. 3–85,[3] No. 4–63 [4]).

29. a. Chemical reactions occurring in obtaining acetic acid by the synthetic method.

b. Problem: to perform the reactions characterizing the chemical properties of phenol.

30. a. Fats, their composition and application.

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[3] Given in Gold'farb IA. L. *and* Smorgonskii, L. M. *Zadachi i uprazhneniia po khimii* (Problems and exercises in chemistry), 1950-1956 editions, Moscow, State Publishing House for Teaching and Pedagogical Materials.

[4] Idem., 1957 edition.

(See the appendix at the end of the examinations section. Problems have been selected from the 1957 edition only.)

b. Problem: to obtain an assigned substance by means of an exchange reaction and to separate it from the mixture. To compute on the basis of the reaction equation what quantity of each of the initial substances is required for obtaining the indicated quantity of the product.

31. a. Starch, its composition, physical and chemical properties, application.

b. Problem: to perform the reactions characterizing the chemical properties of sulphuric acid.

ENGLISH

1. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text compound and derived [common or abstract] nouns; in the derived nouns indicate the suffix.

2. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text derived adjectives and indicate the suffixes in them. Determine the degrees of comparison of adjectives contained in the text and describe methods of forming them.

3. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text compound (derived) indefinite pronouns. Explain their use.

4. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Indicate in the text various functions of the verb *to have.*

5. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Indicate in the text various functions of the verb *to be.*

6. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text the modal verbs. State their morphological peculiarities.

7. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Enumerate the irregular verbs contained in the text and give their fundamental forms. Show the role of each form in the formation of tenses.

8. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text forms of past tenses. Explain the difference in their meanings.

9. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text a verb in the *Present Indefinite* employed as the future tense. Explain its use in the given text.

10. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text verbs in the *Present Indefinite* and in the *Present Continuous;* explain the use of these tenses in the given text.

11. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text verbs in the *Present Perfect;* explain the necessity of using *Present Perfect* in the given text.

12. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text verbs in the *Past Indefinite and Present Perfect;* explain the use of these tenses in the given text.

13. a. Reading and translation of an unfamiliar text with a dictionary Answers to questions relating to the text read.

b. Find in the text verbs in the *Past Perfect;* explain the necessity of using *Past Perfect* in the given text.

14. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text a complex sentence with the verb in the main clause in the past tense; explain the use of the tense in the subordinate clause.

15. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text verbs in the *Passive Voice*, in the translation of which into Russian the passive voice is not conserved. Explain the formation of the (form) *Passive Voice*.

16. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text verbs in the *Passive Voice*, in the translation of which into Russian the passive voice is not conserved. Show ways of translating the English passive voice into Russian.

17. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text an unreal conditional clause and explain the use of cases in the given sentence.

18. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find the participles in the text. Define their function in the sentences. Show ways of translating participles into Russian.

19. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text a *Gerund*. Define the syntactical function of the *Gerund* in the text read. Show ways of translating into Russian.

20. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text a compound object with a participle. Show ways of translating into Russian.

21. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text a compound object with an infinitive. Show ways of translating into Russian.

22. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text an interrogative sentence, determine its type, and explain its word-order. For this passage, raise the problems of using another type.

23. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text a sentence with direct discourse and convey its meaning in indirect discourse.

GERMAN

1. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read the nouns, determine the declension types of these nouns, and give the characteristics of each declension type.

2. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read compound nouns, describe the methods of forming compound nouns and translating them into Russian.

3. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read nouns in the plural ending. Describe the fundamental types of formation of plural nouns.

4. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read nouns in various cases and determine their syntactical role in the given sentences.

5. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read the prepositions and describe their role [governing other words] and employment in the given sentences. Enumerate the prepositions governing the accusative and the dative cases.

6. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read personal and possessive pronouns and explain their use in the sentences.

7. a. Reading and translation of an unfamiliar test with a dictionary. Answers to questions relating to text read.

b. Find in the text read the pronouns *man* and *es* and state their syntactical role in the sentences.

8. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text adjective attributes and adjective predicate nominatives; indicate their peculiarities. Show ways forming degrees of comparison of adjectives.

9. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read the dates; indicate what numerals are employed for the use of dates and how dates are signified in writing.

10. a. Reading and translation of an unfamiliar test with a dictionary. Answers to questions relating to the text read.

b. Find in the text read the verbs; determine their conjugation types. Indicate the peculiarities of the weak and of the strong conjugations in the *Prāsens* and the *Imperfekt*.

11. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read auxiliary verbs. Tell about the role of the verb *sein* in the German sentence.

12. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find the in text read *Partizip I* and *Partizip II* and determine their syntactial role in the sentence. Tell about the formation of the *Perfekt* and the *Plusquamperfekt*.

13. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read instances of prepositional and non-prepositional government of verbs; name the prepositions and the cases of the words which they govern.

14. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Explain instances in the text read of expressions of modality with the aid of modal verbs. What other modal verbs do you know?

15. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read infinitive groups and determine their syntactical role in the sentences. Name the instances in which the infinitive is used with the particle *zu*, those in which it is used without the particle *zu*.

16. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read sentences in the passive form; determine their tense forms; tell of what verbs the passive voice may be formed and how it is translated into Russian.

17. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read an unreal conditional sentence; explain the use of the tense form *Konjunktiv* in unreal conditional sentences.

18. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read the *Konjunktiv* in indirect discourse; explain the use of the tense form *Konjunktiv* in indirect discourse.

19. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read different types of predicates and perform a morphological analysis of them.

20. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read attributes, supply questions corresponding to them, and give a morphological analysis of them.

21. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read adverbial phrases, supply questions corresponding to them, determine their type and analyze them morphologically.

22. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read the objects, supply questions corresponding to them, and analyze them morphologically.

23. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Determine the word order in simple expanded [i.e., with compound subject or predicate] declarative and interrogative sentences of the text.

24. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find the means for expressing negation in the text read and give an explanation of them.

25. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text read subordinate clauses, supply questions corresponding to them, determine their types. Name the formal characteristics of a subordinate clause.

26. a. Reading and translation of an unfamiliar text with a dictonary. Answers to questions relating to the text read.

b. Find in the text read non-conjunctional subordinate clauses and determine their types.

FRENCH

1. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Indicate in the text personal objective pronouns preceding the verb. Explain their functions in the given text.

2. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text adverbial subordinate pronouns [*adverbial'nye sluzhebnye mestoimeniia*] and explain their use in the given sentences.

3. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text possessive pronouns or possessive adjectives and explain the use of both.

4. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text demonstrative pronouns and demonstrative adjectives and explain their use in the given text.

5. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text the pronoun *don't*. Determine its functions and the types of subordinate clauses which it introduces.

6. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text relative pronouns *qui* and *que*. Determine their functions and the types of subordinate clauses which they introduce.

7. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text the relative pronoun *lequel*. Determine its functions and the types of subordinate clauses which it introduces.

8. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Indicate in the text instances of various usage of the verb *être*.

9. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text verbs in the *Passé simple* and the *Passé composé*. Explain the difference in the use of these tenses.

10. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text a verb in the *Imparfait* and explain its use in the given text.

11. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text a verb in the *Futur immédiat*, tell about the formation of this tense, and cite the possible ways of translating it into Russian.

12. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text a verb in the *Passé immediat;* tell about the formation of this tense and its translation into Russian.

13. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text a complex sentence with a subordinate conditional [clause] and explain the use of tenses in the given sentence.

14. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text a verb in the *Subjonctif*. State the general rule for forming the *Subjonctif*.

15. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text a subordinate object clause with the verb in the *Subjonctif* and explain its use in the given sentence.

16. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text a *Participe passé* and explain its use and agreement in the given sentence.

17. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text a *Participe présent* or *Gérondif*. Tell about their formation and their function in the given text.

18. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text verbs in the passive voice and determine the tenses of the verbs. Explain the formation of the passive voice of the verb.

19. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text an interrogative sentence and explain its word order. Supply for any one sentence in the text read a corresponding question using a different structure of interrogation.

20. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text a sentence with a direct question and convey its meaning in indirect discourse. Explain the difference in word order in the first and the second statements.

21. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text a complex sentence with the verb in the main clause in the present tense and explain the use of tenses in the subordinate clause.

22. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text an infinitive construction and cite various methods of translating it into Russian.

23. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text a verb with a personal ending standing before an infinitive and determine its meaning in the given sentence. Name other verbs which change their fundamental meaning before an infinitive.

24. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Locate in the text a sentence with an emphatic expression and explain its use.

25. a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text all derivative words and locate their roots and suffixes.

Appendix

Physics problems

No. 3, Zn. 861: Determine the voltage on the terminals of a cell having an electromotive power of 2 volts and an internal resistance of 0.8 ohms, and connected by a nickel-plated conductor 210 cm. long with a cross-section surface of 0.2 mm^2.

No. 4, Zn. 922: An elevator weighing 1.2 tons rises 15 meters in 0.5 minutes. The voltage on the terminals of the motor is 220 volts, and its efficiency is 90%. Find: (a) the energy consumed by the motor in kilowatts; (b) the intensity of current in the motor; (c) the energy dispensed in one ascent; (d) the cost of one ascent at the rate of 4 kopeks per hectowatt-hour.

No. 5, Zn. 973: In the electrolysis of $ZnSO_4$, the work was completed in 10 hectowatt-hours. Determine the quantity of zink produced if the voltage on the terminals of the vat was 4 volts.

No. 6, Zn. 1121: Two lamps of 50 candle power both hang at a height of 1 meter above the table. The distance between the lamps is 1 meter 40 cm. Find the extent of exposure of the table to light (a) under each lamp; (b) at a point equidistant from the two lamps.

No. 8, Zn. 565: A steam-driven hammer weighing 10 tons falls from a height of 2.5 meters onto an iron block weighing 200 kg. How many times must it fall in order for the temperature of the block to rise to 40°? 60% of the heat generated by the blows goes into heating the block.

No. 9, Zn. 545: In determining the specific heat of copper a pupil heated a 500 gram copper weight up to 100°, and then dropped it into an aluminum calorimeter weighing 60 grams and containing 400 grams of water. The initial temperature of the water in the calorimeter was 15°, and its final temperature 23.4°. What amount of specific heat did the pupil ascertain to be in the copper?

No. 11, Zn. 641: In a cylinder of 40 litres there are 8 kg of compressed oxygen at 15°. Find the pressure of the oxygen.

No. 13, Zn. 721: In a container there were 500 grams of water and an equal amount of ice at 0°. What quantity of steam at 100° would be needed to melt all of the ice and to raise the temperature in the container to 30°? The specific heat of the container is 40 calorie/C°.

No. 14, Zn. 750: The average (mean) pressure of vapor in a cylinder of a steam engine is 10 kg per cm². The surface of the piston is 200 cm², the stroke of the piston 50 cm, and the number of revolutions per minute is 180. Find the machine's horsepower.

No. 15, Zn. 110: A train weighing 1,000 tons leaves the station. What speed will this train reach over the distance of one kilometer, if the engine develops a traction of 22,000 kig, and the force of resistance to motion is considered to remain constant and constitutes 0.005 of the weight of the train? How long will it take for this speed to be achieved?

No. 16, Zn. 102: [Not appropriate; includes diagram not reproducible here.]

No. 16, Zn. 121: [Idem.]

No. 17, Zn. 71: A bullet is shot from a rifle at the speed of 865 meters a second. What will be the speed of the rifle's recoil, if its mass weighs 470 times more than that of the bullet? Why is it recommended that the rifle be held firmly against the shoulder at the time of the rifle's firing?

No. 18, Zn. 482: An automobile which weighs 5 tons with its load proceeds along an arched bridge at a speed of 21.6 km per hour. What is its pressure upon the middle of the bridge, if the radius of the bridge's curvature is 50 meters?

No. 19, Zn. 472: [Not appropriate; includes diagram not reproducible here.]

No. 20, Zn. 494: A Soviet stratosphere balloon in 1933 reached a height of 22 km. The entire basket of the balloon weighed one ton at the earth's surface. How much did its weight diminish at the height of 22 km?

No. 21, Zn. 175: How much work is produced by steam in raising a hammer weighing 5 tons to a height of 80 cm?

No. 22, Zn. 199: A truck weighing 3 tons travels at a speed of 36 km per hour. How great a brake force can stop it in a space of 50 meters?

No. 23, Zn. 218: A container weighing 250 kg falls from a height of 800 meters. At a point 100 meters above the earth during its fall, what is its potential and kinetic energy equal to?

No. 24, Zn. 314: [Not appropriate; includes diagram not reproducible here.]

No. 25, Zn. 301: [Idem.]

No. 26, Zn. 346: A horse draws a cart weighing 500 kg up a mountain. The length of the incline is 1.5 km and the height is 100 meters. Determine the work accomplished by the horse against the force of gravity and the force of friction. If the coefficient of friction equals 0.06, what is the efficiency equal to?

No. 28, Zn. 328: The head of a nail, which is being extracted by the claws of a hammer lies 8 cm from the point of support of the hammer. The force of the hand is applied to the hammer's handle 30 cm from the point of support. In order to pull the nail out, a force of 6 kg is applied to the handle. Determine the nail's resistance power.

No. 29, Zn. 771: Two little beads equally charged, each weighing 0.5 grams, and each suspended on silk threads 1 meter long, upon mutually repelling each other (after collision), have spread out to a distance of 4 cm between them. Determine the amount of each bead's charge.

No. 30, Zn. 948: How long will it take to heat 1 litre of water from 20° C to 100° C in an electric teapot with a capacity of 600 watts, if its efficiency is 80%?

No. 31, Zn. 502: To determine the length of the second pendulum and the acceleration of gravity, a pendulum on a wire 90.7 cm in length with a metallic ball 4 cm in diameter was selected. The duration of 100 full swings of the pendulum was 3 minutes 13.2 seconds. Compute the length of the second pendulum and the acceleration of gravity.

No. 32, Zn. 526: Determine the distance between adjacent points lying in the same phase if wavelengths are dilating at the speed of 330 meters per second and the frequency of oscillation is 256 hertzian waves.

CHEMISTRY PROBLEMS

No. 1, G–S 13–137: In a laboratory 105 grams of nitrobenzene were obtained from 78 grams of benzene during a nitrating reaction. This amount constituted what percentage of the theoretically possible yield?

No. 4, G–S 1–155: Unslaked lime CaO is obtained through heating limestone $CaCO_3$ (besides the unslaked lime, carbon dioxide gas CO_2 is also formed during the process). How much unslaked lime can be obtained from one ton of limestone containing 10— impurities?

No. 7, G–S 12–94: How many litres of oxygen are consumed during the burning of one litre of: (a) methane CH_4; (b) ethylene C_2H_4; (c) ethane C_2H_6?

No. 14, G–S 12–94: Idem.

No. 15, G–S 4–63: 14 grams of calcium oxide were treated in a solution containing 35 grams of nitric acid. How many grams of salt were formed?

No. 16, G–S 10–14: How many grams of carbon dioxide gas will be produced through burning 500 kilograms of limestone containing 92— calcium carbonate?

EXAMINATION PROCEDURE IN RUSSIA

Admiral RICKOVER. I will quote again from the Department of Health, Education, and Welfare publication, "Final Examinations in the Russian 10-Year School," which describes the method of handling these examinations as follows:

The examination procedure is for each pupil, upon call, to go to the head of the room and to select from a basket one exam card, or ticket, bearing the questions which he will answer. After he has time to examine the ticket and reflect on the problems, he is asked to provide the answers orally and, when appropriate, on the blackboard. Answers are judged by the examination committee of the school, composed of the school director, teachers, and an official from the local district education department. The grade which the pupil receives may range from 5 (the highest mark) to 1 (the lowest); a grade of 3 is passing, but anything lower is not passing. Pupils who receive 5 in all examinations as well as in their other subjects are awarded gold medals; those who get 5 in the final exams but have three or less 4's in other subjects receive silver medals. The Soviet Government recently announced that 1,600,000 students in 1958 successfully completed the 10-year program, including examinations, and received the certificate of maturity * * *.

EVALUATION OF RUSSIAN EDUCATION

As to the actual knowledge acquired by Russian students in the required examination subjects, we have a study made by the College Entrance Examination Board for two subjects—algebra and physics. The Board came to the conclusion that in topic coverage in algebra, the Russian examination involved is roughly equivalent to the College Board advanced mathematics examination; only about 10 percent of the 12th grade students in the United States take the mathematics courses on which the advanced mathematics examination is based.

In physics, the Board concluded that the percentage of problems the candidate is required to solve by the Russian examination system is about double that in the 1956 College Board achievement test and about half that of the advanced placement test, which in that year was taken by only 1 to 2 percent of those who took the achievement

test. These were students who had taken an accelerated program in physics in high school and hoped to score high enough to be permitted to obtain credit for first-year college physics.

A number of scientists have attempted to evaluate the level of study at which Russian entrants to the universities work. It appears that their 10-year school prepares graduates to work approximately at what would be junior college level in the United States; in other words, Russian graduates of their secondary schools are about 2 years ahead of our own high school graduates who have taken a college preparatory course. The Russians graduate at 17; our youngsters at 18. In algebra and physics, the Russian graduates reach a level which only a very small percentage of college entrants achieve here. Moreover, the number of subjects in which the Russians achieve this level is more than twice that of the subjects taken in achievement tests by our students. Fourteen times as many Russians as Americans reached this level in 1957.

I think that is about the best comparison I can make. Large numbers of children in Russia graduating at 17 from a 10-year school do as well, by the record, as do our most talented children after 2 years in college.

I mention this because we still have educationists who keep on chanting that our high school diploma is as good as the Russian school-leaving or maturity examination. That this is definitely not so can be verified from the record.

CRITICISMS OF EDUCATION IN THE UNITED STATES

Now, as an engineer, I have been trained to think logically and on the basis of verifiable facts. The projects I work on would fail if I did not know exactly what was going on. I cannot afford to indulge in illusions or to reject unpleasant facts. I cannot tolerate looseness of thought, looseness of expression, and looseness of ideas. You cannot build a nuclear powerplant unless you have exact specifications; these are not set arbitrarily but are a logical consequence of the requirements set by the forces of nature with which we are dealing. There is no room here for lofty theories which do not work out in practice. We would not get anywhere if we had the loose, hazy thinking you encounter when you bring out the obvious failures of the American educational system. You get nowhere in a discussion of any subject if one side talks factually and the other refuses to face reality.

Certainly it is never pleasant to be a critic. Nobody likes the critic because he upsets things, and forces you to think. It seems to me, however, that there are times when it is irresponsible to avoid criticizing something which one knows to be wrong and dangerous for the Nation as a whole. I feel that every one who has a position of responsibility in this country and who can see and understand what is happening not only has the right, he has the obligation and the duty to speak. For he has been privileged by having been given a chance in our scheme of things where he can observe things that are wrong, and so he must, if he is to fulfill himself, point them out to the people of his country.

This is why I feel so strongly about education—about our failure to give our children as good an education as they deserve and need. To

me, there is nothing more important than to change our educational system in such a manner that it will provide the best possible education for every child; slow, average, and talented.

The men who fought to make education beyond the elementary school available to all our children wanted this kind of broad general education for those whose parents had heretofore not been able to afford the tuition fees. They were a few decades ahead of the European democracies in advocating free secondary education

Unfortunately, when it was found that the majority of youngsters had neither a gift nor a desire for an academic secondary education we downgraded the curriculum until it met the lowest levels of competence instead of setting up different types of secondary schools for the different types of students. When the Europeans decided to make secondary education free, they did not make this mistake. They did not confuse equal educational opportunity with identical education for all in a comprehensive school, as did our educationists. As things stand, those of our youngsters who want to become professional people receive a meager general education in high school and must make up for it in college. We have the curious situation that it actually costs more in the United States to become a professional man than in most of the European democracies.

The more we advance technologically the greater the need of a broad general education for our professional specialists. Without this they do not speak a common language and they do not see their own speciality in broad perspective.

Our people marry very early and there is great pressure to cut down on general education in college so as to get started on professional education. Many professional people here, therefore, lack the broad general education which makes them something more than narrow specialists.

This is where we fall down, and the reason is our poor secondary education. In Europe—because of their strong tax-supported secondary school system—those who begin professional training at the university at about age 18 are already broadly educated persons. Here students require about 3 years at a liberal arts college to obtain an equivalent general education. This has been brought out by many persons who know conditions here and abroad. Yet the National Education Association and the U.S. Office of Education still claim that an American high school diploma is equivalent to the leaving certificate of a European academic secondary school. Even when the high school diploma here is for a college preparatory course, this is not so.

If you agree with me that our primary function in life is to take care of our children, to prepare them to meet the many problems which life brings, and that this can best be done by passing on to them the knowledge and wisdom of the past, together with what we ourselves have added in the present, then I am certain that you will feel that the most important obligation of Congress today is to get into this educational problem, to find out the real truth, and to take steps to remedy the real defects. What Aristotle said 2200 years ago remains true today—that the primary function of any legislative body is the education and training of its youth.

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COMPARISON OF SCIENTIFIC AND PROFESSIONAL MANPOWER IN THE UNITED STATES AND RUSSIA

Today we are not educating enough young people, and this is true whether we consider education as valuable primarily for the pleasure and the good that a human being derives from it, or whether we recognize it as the single most important element in national strength—the greatest protection for our country's freedom and prosperity. In 1957, the Russians had 1,475,000 scientific and professional people—we had 1,330,000. This is about a 10-percent imbalance in favor of the Soviets. But there is another significant thing: 30 percent of the Russian scientific and technical people hold degrees that are higher than our own, degrees that correspond to what we normally call a Ph. D. degree. The latest estimate is that by 1961 Russian manpower will probably increase to 2 million, or about 25 percent larger than the estimated U.S. strength of about 1.6 million. The disproportion in academic degrees will be even greater than it is today because the Russians are improving their education not only massively but also in quality. The rate of growth of Soviet manpower in 1961 will be about 8 percent per annum, while the U.S. rate will be about 5 percent.

About 55 percent of Soviet scientific and technical manpower and about 35 percent of Soviet holders of advanced scientific and technical degrees are engaged in engineering fields as compared with about 35 percent of U.S. manpower and 10 percent of U.S. advanced degree holders. The Soviet engineering force is about 60 percent greater than its U.S. counterpart, and the number of Soviet holders of advanced engineering degrees is about 4.7 times larger than the number of U.S. degree holders. Current Soviet engineering graduates are more than twice the number of current U.S. engineering graduates, and current Soviet accessions of advanced engineering degrees are almost 4.6 times greater than current U.S. accessions.

Soviet scientific-technical graduations have risen rapidly since 1946, and will continue to rise rapidly through 1960 and probably 1961. U.S. graduations commenced to rise in 1956 and will continue to rise, but Soviet graduations will remain larger than those in the United States. Soviet graduations will approach a level of about 200,000 in 1961, as compared with about 127,000 expected in the United States. While Soviet graduations in 1957 were about 40 percent larger than those in the United States, in 1961 they are expected to be about 60 percent larger.

The importance of education was realized by Stalin. As long ago as 1935 he said that the Russian slogan must henceforth be "trained manpower decides everything." The impact of trained Russian manpower is just dimly being realized in the United States. I will put it this way:

As long as we were surrounded by friendly oceans so that no one could really attack the United States; as long as the standard of living in our country depended entirely on what we ourselves did to exploit our huge, rich country—as long as we were indeed a self-contained island—it did not matter that our educational system was inferior to that of most other advanced industrial nations. It did not matter, that is, to the strength and power of the United States though it did, of course, matter to individual citizens. Today we depend heavily

on imports of raw materials for production of the many things which make up our high standard of living and our military strength. We are no longer protected by oceans; we have ceased to be an island. We are now as much involved with the rest of the world as older nations always have been. Such involvement is the natural condition of nations—we merely had an exceptionally favorable situation which was bound to come to an end.

We now have much less choice of deciding for ourselves what we can do or want to do. We have compulsion from outside; others can seriously interfere with us by preventing the necessary flow of raw materials, for example. We must face up to the problems which all nations normally encounter. To do this we must have well-educated citizens. Education has now become one of the main factors for survival. In this altered condition of American life we do not presently educate enough young people, and we do not educate them well enough either.

IMPORTANCE BEING GIVEN TO EDUCATION IN RUSSIA

As I went about trying to see as much as I could in Russia, I was struck again and again with the importance being given to education there. The high respect accorded education shows up most dramatically when one compares the kind of life led by the mass of Russians with that of their university students—it is as night to day. The Russians have a norm according to which each person is legally entitled to a minimum of nine square meters of living space—about 108 square feet. The average however is less; in Sverdlosk, a large manufacturing city, it is 5.2 square meters, or 62 square feet. Many Russians live several persons to a room, and with many sharing a single toilet. A child who lives in such a crowded manner and who knows that if he does well in school—if he passes his final school examinations with high marks and is admitted to a university—he will then he able to live in a nice room, with running water, and with a shower and toilet he shares with only one or two other students—well, you can imagine that this child will work his head off to do well in school. There is no other certain road to success and to a better life in Russia than through a most rigorous and highly competitive program of education. Moreover, good marks will not only mean going to the university, and through it a future professional career which is well paid and highly honored, but it avoids military service as well.

I visited many apartments and I visited Moscow University and other institutions of higher learning. The contrast is so great that I am certain it constitutes one of the main reasons why Russian children do so extraordinarily well in mastering difficult studies. You have all heard about the hasty construction of housing in Russia. This is true. New houses are not nearly as well built as ours. Standards are lower than ours; comfort and space much less. The housing shortage is so acute that they are in a hurry to build, and cannot give too much thought to permanance of construction. Unseasoned wood which soon warps is often used; little steel goes into their apartment houses. But when you visit Moscow University and similar institutions, you see a big difference. Nothing is too good for such buildings. Any Russian child who visits the dormitories would see that to get into them would be a most desirable accomplishment. Nobody has to force the children to study hard.

I found that the living quarters of students at Moscow University are as good as those of midshipmen at our Naval Academy. I personally visited these places. I did not do it on a conducted tour; I did it completely on my own. I went everywhere I wanted to go and asked all the questions I wanted to ask, and got answers freely.

I had a long conversation with an 18-year-old girl student who had just come from one of the Soviet Asiatic Republics. This is what she told me: Only 2 students from her high school graduating class of 31 got to go to Moscow University; they, of course, were the best ones. Some, of course, went to other universities. These two had successfully passed an examination in Russian, German, English, physics, mathematics, and chemistry. They had studied English for 6 years, German for 4 years, and had had several years study in each of the other subjects. On being admitted to the university not only was all of this girl's tuition paid but she received about 290 rubles a month, which is enough to pay for her rent and food. If her parents were too poor to give her money for small incidental expenses, a student union which has funds would take care of this. Student salaries increase each year, reaching 450 rubles per month for a final-year student. While a student whose grades fall below "good" may be denied a stipend or be required to demonstrate financial need, the student who demonstrates "excellent" grades receives a 25 percent premium. For sake of comparison, the average worker gets about 750 rubles per month.

That is a typical example of how brainpower is valued in Russia. The real threat to us will come through their educational and not through their military processes, because military techniques and weapon systems are transitory; they now change every few years. An intelligent and well-educated body of citizens is something you will have forever. That is where, in my opinion, the Russians are smarter than we. They have recognized the full value of a good education and they are hellbent on giving it to as many of their children as they can coax into taking it.

I talked with Mr. Khrushchev on this point. I can assure you he thoroughly understands that the Russians today are reaping the benefits from the educational investment they made years ago. It takes about a generation to change the curriculum of a school system. In fact, as has been said, it is about as easy to change a school curriculum as it is to move a graveyard. But despite these difficulties I feel that we must get on with improving our school curricula—nothing ought to keep us from accomplishing this and accomplishing it fast. Each year we delay in dealing with our educational crisis Russia moves ahead of us, and it will get harder to make up for the start she has in numbers of well-educated professional people, especially of scientists and engineers.

DESCRIPTION OF TRIP TO POLAND

I should like at this point to give you a brief description of our trip to Poland.

My two most vivid impressions there were, first, the friendliness of the people toward the United States and, second, the rapidity with which the Poles reestablished their educational system after World War II and the earnestness with which Polish children pursue their

studies. They work as hard as the Russian children and for the same reason—education there too is the only certain road to a better life.

Now, as to our reception in Poland. It was a great privilege for all of us to witness the enthusiasm of the Polish people for our country. You hear doubts expressed about the value of our foreign aid programs, of the generosity with which we have individually and through our Government aided people in need. Some people think most of the money has been wasted and that it did not win us friends. I am no expert in this field. I believe we have given Poland about $150 million of credit; we have also sold them for Polish currencies about $180 million surplus agricultural products.

In addition, individual Americans of Polish descent have given most generously. I met people who survived only becuase they were sent food and clothes, and who were touchingly grateful. Anyone who could have seen the welcome received by the Vice President and his party would have felt that we are effective in foreign countries. Many of the people—men and women—were crying as we went from the airport to the city, a distance of about 10 miles. All of us in the party were so touched and felt so proud to be Americans we had no time to look at the city. We were busy waving at the people, trying to show them how much we appreciated the heart-warming reception they were giving us. The obvious friendliness toward us, as Americans, was my chief impression of the entire trip. We felt this in the Russian people too, although they were not as demonstrative as the Poles.

STATUS OF SCHOOLS IN POLAND

The other thing that made a lasting impression on me during our visit to Poland was the state of their schools. Mind you, here is a country that was devastated just a few years ago. Seven million of their people, 25 percent, were killed and many more were wounded during the war. Eighty percent of the city of Warsaw was systematically razed to the ground. In November 1939, the Germans rounded up all Polish intellectuals and sent them to concentration camps where many died. Many of the school buildings were destroyed. Few teachers were alive when the war ended. Yet, today, Polish children are going to school 6 hours a day—and I am not talking about study periods, 6 hours a day of recitation—6 days a week, 10 months a year. Students graduating at 18 from their academic secondary schools do as well or better than our children after 2 years of college.

DISCUSSION OF THE PROBLEMS OF EDUCATION IN UNITED STATES

I could not help wondering whether we in this country—privileged as we are to live in a land blessed with every material possession anyone could possibly wish to have—whether we are worthy of the great tradition established over 175 years ago. Are we not neglecting the things of the mind in our near total absorption with comfort and material wealth, with having a good time and with getting by with as little effort as we can? It is this emphasis on a good time and on avoiding effort which prevents our children from becoming as well educated as children abroad. To become educated takes sustained effort, hard

work, excellent instruction by teachers who themselves are excellently educated and who thoroughly know their subjects. Frills, know-how subjects, easy snap courses may seem agreeable to our children today, but they shortchange them for the future. They will have to live in a world where other people are better educated than they. The world outside the United States is being transformed so rapidly and so completely that we cannot afford to stand still. In my opinion we are not adequately planning for the future. Education must be given priority in our scheme of things. Education benefits both the Nation and its individual citizens. It takes a long time to produce highly educated professional men. If we don't take steps now to make sure we do this through our educational system, we will inevitably be bypassed by Russia. The consensus of those qualified to judge is that only a drastic reform in American education will permit us to remain in front.

Improving our schools will be no easy matter. Money alone won't do it. The dollars you spend on education are the cheapest dollars that you can spend, even if some of them are wasted. They are by far the cheapest dollars, and they can give the greatest return.

I do not believe that we can solve all our problems just by using energy or spending more money. We are too much inclined to believe this here. Many problems can be solved easier and more quickly if we think them out and really search for a good solution—but it is more painful to think than to spend money or to be energetic. There is much evidence that the education dollar buys less really good schooling in the United States than in any other country in the world. I am sure we could make great improvements simply by spending more wisely and more efficiently the funds we now have.

The reason there is waste of money on missiles and other technical projects is because we don't have adequately educated people. I think we would save many times as much as any added money we spend on education. This is what I don't understand: Why Members of Congress are willing to appropriate large sums of money for things which they know may not succeed, but will hesitate to spend money to set up educational standards and otherwise help education, when the return on the investment is certain and great.

At this point, sir, I would appreciate it if you would ask me questions. I feel I can develop the subject better that way.

QUESTION AS TO THE TEACHING OF HUMANITIES IN RUSSIAN SCHOOLS

Mr. RHODES. Do the Russians teach anything in the way of social studies? Do they try to teach their children to be good citizens, or are they concentrating completely on the physical sciences?

Admiral RICKOVER. We are frequently told that the Russian 10-year school gives a one-sided technical education while our high schools educate the "whole child." But the Russians are not just graduating technicians. Recently two prominent educators—Dr. Harlan H. Hatcher, president of the University of Michigan at Ann Arbor, and Dr. F. Cyril James, president of McGill University in Canada—came back from a tour of Russia. Dr. Hatcher was head of a group of six educators who visited various types of Russian schools to study their educational system. The tour was sponsored by the Ford Foundation.

As reported in the New York Times, the educators were greatly impressed by the high priority the Russians were giving to education and the effectiveness with which the system appeared to be producing results. Their principal impression of Soviet higher education was one of drive, pioneering spirit, and high competence. They sensed the vigor in the entire system. They said that the Russians have made education the central part of their national effort because they feel they have to do so to elevate their society; they also realize that they must place major emphasis on scientific education. The Russians consider it like the electrification of a country—the powerplants must be built first. Education is their powerplant. They feel thay cannot get results until they have produced many qualified and educated people. Dr. Hatcher added that in the pursuit of scientific work the Russians have not neglected the areas of culture and the arts; the students work very hard; their reading is very heavy—although it is done largely from a Communist viewpoint.

These educators also noted that Soviet society is moving at a much faster rate than is generally realized either here or abroad; that education is their motivating and guiding force in this evolution. Dr. Hatcher said it was time "my countrymen begin to understand that changes can take place in the Soviet system and that these changes are actually occurring before our eyes."

These American educators devoted chief attention to the humanities and were surprised to find that, contrary to the reports of some observers, Soviet humanities were not being skimped for the sake of science. Dr. Hatcher gave much credit to the excellent foundation laid in the Soviet 10-year schools in languages and in literature, not only of Russia but of foreign countries. "Students arrive at the university wonderfully well prepared. They have excellent study habits. Their extracurricular activities are tied into serious subjects. Reading habits are widespread and good. The use of libraries is exceptional." Dr. Hatcher also said it was his opinion that Soviet scientists, engineers, and technicians had a broader basis of the humanities than many in the United States.

In comparing the system of higher education in the Soviet Union with those of Britain, France, and North America, Dr. James said that the first three countries share a similar formula which makes their system superior to that of North America; that in these three countries every able student can go to a university at no cost to his family and scholarships are based on means tests. He said special exams are given at ages 11 to 12 and at 17 or 18 to determine who should pursue a university education and who should advance in other fields of endeavor. He said professors are most respected in the Soviet Union and, in fact, the professors and students are a privileged class, making the field of education one of the most competitive in the country. Competition is so tough that in Russia there are far more applicants to universities than acceptances. Russian students, he reported, know foreign languages better than our students. He added that we have no evidence that our high schools offer students more opportunities to get acquainted with great literature, art, or music; and that, in addition, the Russians are being much better trained in the sciences.

What these educators found is confirmed by a professor of physics upon his return from Russia. He submitted an official report to the U.S. Department of Health, Education, and Welfare, and he stated

that the physics which 10-year school graduates in Russia know is the equivalent to what is known by a 2-year student at Columbia University who is specializing in physics. He said the same is true in other subjects. Does this answer your question?

Mr. RHODES. It does.

Admiral RICKOVER. They are taught Communist ideology, there is no question about that. But they are also taught many solid subjects to which no ideology is attached.

DISCUSSION OF FUNCTION OF FORMAL EDUCATION

Mr. RHODES. We have the question of what kind of children we want to raise. I doubt that we want to raise children like the Russians do; anyway I cannot imagine what kind of pills they feed these children to make them so brilliant they can absorb the physical sciences, the social sciences, and still have what we would call a normal childhood. Something must be left out. You are not saying we should change our whole way of life because of this?

Admiral RICKOVER. No, sir, we should not. We must recognize that formal education is only one part of the training of youth. As I said, there is a distinction between training and education. The function of the home and of the church is to train our youngsters. Children, when they are born, are little savages. The training they get in the home and in the church, if it is good, will prevent them from becoming big savages when they are 20 years old; we have plenty of big savages in this country.

Now, the function of formal learning—and it can be done best in school—is to train the intellect. This distinction between training and education is not thoroughly understood. When you teach a boy how to operate a lathe you are training him, you are not educating him. Training does not develop his mind. Education is a process by which the mind is developed. In education the Russians are doing better than we. There is no purpose in bringing up the difference in ideology between communism and democracy; it is not relevant in defining education. You have the same system of education in Western Europe as in Russia. You have it among the totalitarian states and you have it among the democratic states. It can produce a Hitler or it can produce a Thomas Mann.

UNIVERSAL EDUCATIONAL TRAINING IN RUSSIA

Mr. THOMAS. Admiral, what about universal educational training in Russia? I was there in November of last year and everywhere I turned they would harp on compulsory training. In the cities it was 9 or 10 years and in the hinterland, way down on the sea of the Turkish border, those provinces had 5 years. They said that they were going to make it universal, that everybody had to go to school for 10 years Did they put that off?

Admiral RICKOVER. Their plan is to have a universal 10-year educational program by 1961.

Mr. THOMAS. They did not put it over this past year?

Admiral RICKOVER. They have it in the large cities.

Mr. THOMAS. I am talking about in the rural sections of the country.

Admiral RICKOVER. Soviet children are now compelled by law to complete at least 7 years of schooling. They have 7 years in the rural areas; 10 years in the cities, but let me tell you what this all means—the difference between 10 and 7 years—because the boys and girls who graduate from the Russian 7-year schools know as much as many of ours who graduate from high school.

Mr. THOMAS. I have my doubts about that.

Admiral RICKOVER. Here is a strange thing about having doubts: everybody wants to hear the good things. Now, the good things can take care of themselves, but you have many competent observers who come back and make reports. If Russia succeeds in making 10 years compulsory for all her children, she will be well ahead of us. Graduates of the Russian 7-year schools have had in classroom hours the equivalent of 14 Carnegie units in Russian language, grammar, and literature, 7½ in mathematics, 1½ in history, 1½ in geography, 1½ in biology, 1⅓ in physics and chemistry combined, 2 in a foreign language, or a total of 29⅓ Carnegie units in solid subjects, besides drawing, singing, physical education, technical drawing, and some practical work in shop or agriculture. All of them have done a great deal more homework than is customary in our schools. We have today 7 States in the United States that have compulsory 8-year school, 33 that have 9, 7 that have 10, 2 that have 11, and 1 that has 12 years. But that is not the whole story, because it isn't only the number of years the children go to school, but also how much time they put in. For example, when you compare the years spent at school by a Danish child, you must consider that he goes to school 280 days while ours go 180 days—this means that 9 years' schooling in Denmark is equivalent in class hours to 14 years here. I believe you would find that children with minimum ability to absorb academic subjects abroad who go to school perhaps only until age 14 or 15, have learned at least as much as similar children who graduate from high school here.

These are unpleasant facts but according to the best information we have they are true. If they did not greatly worry me, I should certainly not devote almost all my leisure time to education. I am here because of this. I have to take off time from my real work to be here. I do not have a minute's time.

Mr. THOMAS. It is not hurting you to come over here. If you are making a sacrifice——

Admiral RICKOVER. I am not making a sacrifice. I am doing it because it is my duty to do it.

Mr. WHITTEN. I would like to raise this point, Admiral. I am not an expert in foreign aid, either, but I was in Poland in late 1956. It is my understanding that Poland, being a satellite country of Russia, has not been a participant in foreign aid. When we were there one of the complaints they had was that they had not been in on the foreign-aid programs. In fact, we had canceled an agricultural fair. Our friendly relationship, as we gained the impression in Poland, was because of the great number of Polish Americans who have sent so many things to Poland.

There are others here far more expert than I in the field. But using Poland as an example of the benefits of our foreign-aid program, insofar as my meager knowledge is concerned, should not be drawn.

Poland, because she is a satellite country, has to a great extent been excluded. There are probably some exceptions.

Admiral RICKOVER. Please understand, sir, the purpose of my discussion is not foreign aid. Most of the foreign aid to Poland has been through members of families, because there is hardly a family in Poland that does not have a relative in this country, and it was very obvious they were getting aid both in food and in clothing from American sources. I was not addressing myself to the quantity of aid. I merely made that as a point in passing to illustrate the great friendliness of the Polish people. I do not want to get involved in the foreign-aid bill.

Mr. CANNON. Mr. Riley.

TEACHING OF LANGUAGES IN RUSSIA

Mr. RILEY. Coming back to languages, are there not a number of different languages in Russia, or in the Soviet Union? Do they teach one universal Russian language and then French, English, and others in addition to that?

Admiral RICKOVER. Russian, which is the official language, is taught throughout the Soviet Union. They also teach the local language, and in addition they teach foreign languages. It is the foreign languages that get the great stress. For example, 50 percent of the boys and girls now going to secondary schools are being taught English. About 10 million Russians are studying English. A few thousand Americans are studying Russian.

Mr. CANNON. Is education free in Russia?

Admiral RICKOVER. Yes, sir. Education is completely free in Russia.

ACHIEVEMENT OF THE 10-YEAR SYSTEM IN RUSSIA

Mr. CANNON. They have a 10-year system over there which seems to be the keystone of their system. How does it prepare them for university?

Admiral RICKOVER. Russian universities resemble the universities on the Continent of Europe—that is, they are primarily professional schools and therefore equivalent to our own professional schools; they are closer to the graduate departments of our universities than to our liberal arts colleges. The Russian maturity examination represents perhaps a year or so less education than the maturity examination of continental European countries which is a prerequisite to entry in a university. I may interpolate here that if American students wish to enter a European university, they are usually required to have a bachelor of arts degree—in other words, Europeans equate our bachelor of arts with their own secondary school maturity examination or, as it is called in France, their own baccalauréat.

We tend to overvalue our high school and college diplomas and to think of our college as corresponding to a European university. It would be quite inconceivable for the graduate of a European academic secondary school to know as little as the average holders of our bachelor of arts degrees whom Jacques Barzun describes in his recent book, "The House of Intellect." He calls them "young men and women of unquestionable gifts, energy, and zest, whose fine intelligence is not matched by strength of intellect." They have, he writes, "freshness of taste and openness to novelty," but "no knowledge that

is precise and firm, no ability to do intellectual work with thoroughness and dispatch." Of these college graduates, aged about 22, contemporaries of Europeans who are close to earning their doctorate in law or medicine, he writes that "many of them cannot read accurately or write clearly, cannot do fractions or percentages without travail and doubt, cannot utter their thoughts with fluency or force, can rarely show a handwriting that would pass for adult, let alone legible, cannot trust themselves to use the foreign language they have studied for 8 years, and can no more range conversationally over a modest gamut of intellectual topics than they can address their peers consecutively on one of the subjects they have studied."

Professor Barzun teaches in the graduate Department of History at Columbia University. He is thus thoroughly familiar with students who have had the 16 years of education required of those who wish to undertake graduate studies.

To the best of my knowledge, based on many reports of scientists and engineers who have been in Russia and who have attempted comparisons, the Russian 10-year school graduates have reached an achievement level corresponding to about 2 years of college here; that is, 1.6 million Russians reached that level in 1957—probably more today. This must be close to the percentage of fifth graders who eventually graduate from our high schools—53 percent in 1957; about 58 percent today. But the Russian youngsters have learned much more than ours.

Mr. CANNON. Do you think we are educationally equipping our children, Admiral Rickover, for the space age?

Admiral RICKOVER. No, sir; I do not. That is the gist of what I have been trying to say. I think that many American parents consider teenhood as chiefly a time for the children to have a lot of fun; abroad it is considered a period of preparation for adulthood. I firmly believe that many of our children, left to themselves, would do much better at school if their parents by their own lazy habits did not set them a bad example; if the parents were not so solicitous about the children having a good time, giving them cars, fancy clothing, and so on.

STANDARDS FOR TEACHER TRAINING IN RUSSIA

Mr. CANNON. Are their standards for schools and teachers recognized in this country?

Admiral RICKOVER. They are known to a few people in this country, but they are not recognized or emulated. For example, in 1957, when Miss Lowman wrote "Education in the U.S.S.R." for the U.S. Office of Education, the book was cut in half by the editorial staff of the Office. Among important parts cut out, Miss Lowman lists sections of the chapter on teacher training, such as: "illustrations of the curriculums for each type and level of training" of teachers. In her article "An Adventure in Red Tape," published in the Saturday Review of August 9, 1958, Miss Lowman writes of the editorial treatment given her study: "Errors of distortion were numerous * * *. In attempting to 'improve' (the chapter on teacher training) only two curriculums were left in—one for kindergarten teachers and one now practically obsolete for primary schoolteachers. There is no indication of the kind of training the vast number of secondary schoolteachers receive. That alone was bad enough. But the now almost

obsolete program for primary schoolteachers was set forth as representing the training all Soviet teachers get."

In Western Europe—and the Russians have adopted the Western European school system—a teacher in secondary school has the equivalent in education of about what a lawyer has in this country. The teachers in Western Europe and in Russia who instruct the upper classes of secondary school are much better trained than ours.

Mr. CANNON. Mr. Lipscomb.

STUDENTS IN RUSSIA NOT ATTENDING THE UNIVERSITY OR TECHNICAL SCHOOLS

Mr. LIPSCOMB. Admiral Rickover, why do you not tell us something about the other side of the coin, such as what happens to students when they do not cut the mustard, and about the state taking over children at the age of 4 or 5? What is your opinion of that?

Admiral RICKOVER. You must not misunderstand what I am trying to say, sir. I am not advocating that we copy the Russian political-social system. I am only addressing myself to one aspect, to education—to the training of the intellect—and it is my contention that in the training of the intellect the Russians are doing a better job than we. It is unfortunate that every time one mentions the accomplishments of some foreign country people think that he is advocating that we adopt their government and their way of life. I have frequently been accused of recommending adoption of the Russian system because I say some good things about it. I believe there is a saying—"Know thy enemy." It is also a truism in military matters that intelligence is most important. You must find out what your opponent is doing; and the same is true in science, and it is true in education.

There is nothing wrong in finding out what the Russians or anyone else does. We must not get to the point that we say the Russians do nothing well. You know, until about 4 or 5 years ago, our own Navy people were saying that the Russians couldn't be good seamen. Now we are worried about the large number of submarines they have and what they might do to us. We mustn't delude ourselves. If we fail to admit, when it is true, that other countries are doing something better, we harm only ourselves. In fact, if they do something better we harm only ourselves. In fact, if they do something better than we do, we shouldn't be ashamed to adopt it. As it is, the Russians do not, in my opinion, have a greater secret weapon—one which undermines our ability to win the cold war more effectively—than our own progressive educational system; and they didn't have to do a thing to get it. We set it up ourselves, with the best intentions in the world. If I were the Russian Government, I would do all I could to keep us from changing our present system of education.

In further answer to Mr. Lipscomb's question, they select about the top 30 percent of their secondary school graduates to go on to the university. The rest of them either go to technical schools, are drafted into the army, or become workers.

Mr. THOMAS. They go to the technical schools.

Admiral RICKOVER. Some of them go to technical schools.

Mr. THOMAS. They do not throw them away, by any means.

Admiral RICKOVER. No, sir. I am fully aware of the defects in their system: that those who do not go on to the universities or to technical schools have no choice but to become workmen or peasants, and they are also subject to army service. Good students in selected fields—notably science and engineering—are exempt from the draft. There is a chance later on for those who go to work after leaving school to continue their education at night school. In fact, Mr. Khrushchev's latest idea is not to let any students go on to universities until they have worked for 1 or 2 years and studied at night, but that plan is not yet being fully carried out. The bright graduates are still going directly to the universities.

Mr. CANNON. Mr. Taber.

SELECTION OF COURSES FOR STUDENTS IN RUSSIA

Mr. TABER. Admiral Rickover, is it not true the trouble with the American school system as compared with the Russian school system is largely the fact that in Russia the courses that the young folks take are laid out for them by superiors who are properly trained to do that and our children are allowed to go into whatever college courses they happen to be interested in at the moment, without any substantial guidance on the part of the superior?

Admiral RICKOVER. That is correct, sir. What we have done in this country is to build up a vast bureaucracy of school administrators, school public relations staffs, and so on. As a case in point, 2 weeks ago there was a meeting of school public relations officers right here in Washington. I just do not know why we need to pay any public relations staffs in our school system. We have this vast bureaucracy, and since many of these people are not really competent teachers themselves, you get a lot of amateur sociology and a lot of amateur psychology, a lot of how to find and live with a mate, and such in the schools. It is something that does not belong in an educational institution which should be a place where formal knowledge is taught and where the intellect of young people is developed.

To my mind a vast amount of marginal stuff that clutters our school curriculums is of questionable use. Even where one can make a point that it will help the young people to get along better in life, or to make a better marriage, or to be better liked personally, I feel that such training ought never to be a substitute for the real business of schools which is to instruct children in basic subjects that will give them a better comprehension of the world they live in; to develop the intellectual skill that comes when one has used his mind for 12 years to apply knowledge to practical problems. Anything that is not education pure and simple—as I have tried to define this term—should not be taught during school hours; it could—if a community so wished—be taught after school hours, on Saturdays, or during vacations. But these marginal courses should not, I feel, be paid for by obligatory taxes—they should be a voluntary community program.

I am particularly disturbed by our concept of electives for schoolchildren. Here we have minors whom we carefully protect under our law—just as all civilized nations so protect them—because we know they cannot judge wisely and may therefore harm themselves if we let them decide matters that may adversely affect their future; yet we

let these minors choose the subjects they wish to study in high school—to make their own decisions in matters which will influence them for the rest of their lives. We should not permit that. This is where parents have abdicated the duty and the obligation they owe to their children. It seems to me that when parents bring children forth into this world they assume a deep responsibility to assure that they are properly taken care of and not permitted to go their own way when this would harm them.

Mr. CANNON. Mr. Gary.

Mr. GARY. Admiral Rickover, to what extent is the accomplishment of these children due to totalitarian discipline?

Admiral RICKOVER. It has little to do with totalitarian discipline because there are plenty of children who will take their places if they do not want to study. The Russian system in that respect is no different from the system in Poland, Denmark, Sweden, Switzerland, Holland, Norway, France, Germany, or England. This is a thing that is not understood here. The children simply study harder because they fully realize what education will mean to their future.

Mr. GARY. Are they not under state discipline to make them work harder?

Admiral RICKOVER. No, sir. You cannot make people study harder in school by compulsion. Their parents urge them to study, and the children want to study because they know if they are to get ahead n the world they have to become educated. They do not have well-to-do parents taking care of them and giving them automobiles when they are 16 years old.

Mr. THOMAS. Parents do not have automobiles to give them.

Mr. CANNON. Mr. Ford.

REACTION TO SOVIET ATOMIC POWER FOR MILITARY PURPOSES

Mr. FORD. If I could change the subject a moment, would you mind relating your experience, Admiral, and your observations concerning Soviet atomic power for military purposes?

Admiral RICKOVER. I did not see any Soviet atomic power for military purposes. All I saw were the reactors of the *Lenin* and one other plant which was for central station electric power and for which the concrete foundation had just been laid.

Mr. FORD. Could you tell us about the *Lenin* and the plant that you did see?

Admiral RICKOVER. The *Lenin* has three reactors. She will develop about 44,000 shaft horsepower. She needs only two of the three reactors for full power. I looked at the reactors and at the machinery installation for more than 2 hours, but it was not possible for me to tell what was inside.

Mr. FORD. They did not give you full opportunity to observe all the details?

Admiral RICKOVER. They did give me the opportunity to inspect the plant thoroughly. We already have a great deal of information about the theoretical part of the reactor plant, but you cannot tell about a reactor just by looking at it. You have to wait and see how it works. Many reactors in the United States, particularly in the appropriation stage and in the design stage are very beautiful and

offer great prospects. Many times these promises are not borne out after quite a few years. You can only tell after it starts operating.

Mr. FORD. What about the quality of the equipment you saw with reference to these reactors?

Admiral RICKOVER. The quality of the equipment seemed adequate for the purpose. It may not have been as finished on the outside as ours, but it appeared adequate. The real quality in a reactor is inside the reactor, and that I could not see.

Mr. CANNON. Mr. Mahon.

CHANGES NEEDED IN U.S. EDUCATIONAL SYSTEM

Mr. MAHON. Getting back to education, Admiral Rickover, do you have any idea as to how the American attitude might possibly be changed toward education? We are always interested in the next sports event. Sports and physical exercise are unquestionably good but they do not always create an atmosphere for studiousness. In the midst of this situation how can we create the right attitudes toward education of the mind? Do you think the problem here is a matter of attitude and point of view? What can we do about this situation within our country?

Admiral RICKOVER. We can do some things. The first thing we must do is to recognize that our schools are not the best in the world. The next thing we must recognize is that we are not the only ones who have free education; that other countries had free elementary education long before we did. For example, soon after the Protestant Revolution in the 16th century free schools were started in parts of Germany in order that the people could learn to read the Bible in the vernacular. Prussia made elementary education compulsory—whenever schools were available—as early as 1717. By 1794 compulsory elementary education had been decreed throughout Prussia. In Holland the communes were charged with setting up elementary schools as early as 1806—these schools were free for children of the poor and charged small fees for those who were able to pay. Denmark established compusory education in 1814. The Swiss constitution of 1848 charged the cantons with providing free elementary education; England made elementary education compulsory in 1880, France in 1882. Contrast this with our own country.

Apart from scattered pre-Revolutionary efforts to make education compulsory, we had the first compulsory education law in Massachusetts in 1852 and this required only 12 weeks of schooling per year and only for ages 8 to 14. By 1889, some 25 States had some form of compulsory education but it was effective only in 2—Massachusetts and Connecticut. The last compulsory attendance law was enacted by Mississippi in 1920.

It is true that we were the first country to set as a goal free education through secondary school and even through college. But this too is now the practice in most European countries, and certainly in Russia. Cutting the unnecessary extra years from our system of education would open professional careers to many talented poor children and would save money. It would induce many others to study for a profession who now are discouraged because they do not want to wait too long to go to work and raise a family.

What chiefly holds our children back is our devotion to the one-track system of education—the comprehensive school. Even though we are now beginning to face the fact that you cannot really educate anyone if you put children with an IQ of 70 in the same classroom with others ranging from 70 to 170—or whatever the range may be—our unwillingness to separate children by ability and motivation keeps American schooling extremely inefficient. In a typical sixth grade class the mental level may vary by 6 years. Obviously if you take all of those children and put them in one comprehensive school and in one room, it is bad for all groups. It is bad for the smart ones because they are held back; they become lazy and they become unruly. Many of the children who become problems go wrong simply because they don't have to exert themselves to the best of their ability.

The more homogeneous a class is, the faster can study proceed. Electives cannot take the place of a carefully worked out study course adjusted to various levels of ability and vocational objectives and where each year builds upon what has been learned in the previous year. Only highly educated teachers with a thorough knowledge of their subject matter are able to devise such a careful study plan. All of this has been known in Europe for a century or more. All schools abroad have such plans—usually for from three to six different types of secondary schools. You cannot educate anyone properly if the class represents too large an intelligence spread. That is why today, though education there is also free and therefore democratic, the Europeans still educate their young people in separate schools which are fairly homogeneous as far as ability is concerned.

In this manner they make it possible for each child to proceed at his proper speed in his own homogeneous group. We have given some lipservice to that concept with the recent emphasis on the multitrack system but it doesn't go far enough, chiefly because the multitrack system too often is arranged in such a way that a student with a high IQ is not placed into a top track for his entire course of study but is allowed to choose one track for one subject, another for a different subject; he might, for example, be in the top track in mathematics and the sciences, and in a lower track for English and foreign languages. In this way, the electives system creeps in and we again allow a minor—a young teenager with little judgment—to plan his own course of study.

But, of course, the track system in the large, comprehensive high school is manna for the administrators. You need lots of administrators, football coaches, lots of drum majorettes, and the many other frills which have no real place in tax-supported schools.

We profess to consider it undemocratic to separate children according to their abilities and we talk a great deal about the injustic to children of having their lives determined by some examination taken around age 11. We never consider the damage done to our children when we let them choose among an inviting array of electives where the most useless ones are bound to look most appetizing to a child. It is a rare child who will choose hard subjects when he can get the same diploma by taking easy ones. We must return to the traditional system where a diploma represented actual work done, not just sitting in classroom. We must build up careful study programs for different types of intellectual abilities. As is the case in Europe, we must devise ways whereby a late developing child can transfer from one type of

school to another. Of course he will always lose a year or more if he transfers from a slower moving school to a faster one, but the opportunity exists abroad and we must have it here too.

As a first thing, however, I feel that we ought to abandon the cliche that "ours are the best schools in the world" which educationists are still trying to sell us. Now as to what we can do specifically:

NEED FOR SETTING UP SPECIFICATIONS AND GOALS

As an engineer, I would say the first thing we must do is to set up specifications—what we want our high school graduates to know when they finish at the age of 18. The minute you do that you put courses in etiquette and in baton twirling in their proper place; you begin to see that perhaps you ought not to pay an athletic coach a higher salary than a teacher of trigonometry. We must have specifications. We must set standards for the high school diploma. Now, obviously, we ought to have more than one kind of diploma. We might learn from the Europeans in this matter. They have several types of school-leaving examinations resulting in different diplomas. For example, the British have the O, the A, and the S certificates. The O certificate is called general education certificate ordinary—one gets it at age 15 to 16 after taking a tough examination in from five to seven subjects. The student has a choice in subjects; he can pick academic subjects or practical ones. When you read the advertisements in the English papers you find that for even the lowest level white collar jobs possession of an O certificate is specified, usually one which includes English, mathematics, and other academic subjects. A young person must have a good general education to pass the examination that earns him any O certificate—even one weighted toward practical subjects. An O certificate in solid academic subjects is a prerequisite for an A certificate, or general education certificate advanced level, which is taken 2 to 3 years later and without which one cannot enter Oxford, Cambridge, or any other English university. Since three-quarters of English college students, even at Oxford and Cambridge, study under scholarships, many students also take the S certificate, or general education certificate scholarship level which is of course harder than the A certificate. In all cases, the examinations taken are set, not by the school the student has attended, but by a body of scholars, representing the universities. On the Continent, the final examinations are usually set by a body composed of eminent scholars and laymen.

Everywhere in Europe there are uniform standards for educational goals, while the running and financing of schools is generally left to local initiative. This is the way it is in England and Switzerland. However, since there is general agreement on educational goals, uniformly excellent schooling is achieved by all of them. We allow ourselves to be frightened by arguments that setting national standards would mean Federal tyranny over education. Before we indulge in this sort of argument, we ought to take the time and effort to investigate exactly what such standards mean abroad. In view of our professed fear of the Federal Government, we could not at present set up compulsory national standards. But there is nothing in our form of government to prevent Congress from setting up some sort of commission or council and giving it the task of working out different sets of educational goals for our public schools. The schools could

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disregard them if they so wished, and if the parents in the community did not force them to pay attention. But by having a national set of standards everyone could judge exactly where the local school stood. This would be an enormous advantage to parents who are really interested in having their children "educated" in contrast to having them merely "trained."

ROLE OF FEDERAL GOVERNMENT IN EDUCATION

But it is said that under our constitution the Federal Government is precluded from concerning itself with education. It seems to me that we are unrealistic in this. We give too much weight to mere omission. Education is not mentioned in the Constitution because at the time the Constitution was drafted England had not made of education a governmental concern. Education was, in fact, nowhere fully considered a governmental concern though certain Protestant German states had set up tax-supported schools. There is also no mention of railroads in the Constitution yet we have interpreted the Constitution to allow considerable Federal control over interstate railroad rates. The Constitution does not mention the power to legislate on honesty in labeling of canned goods or drugs, yet we have Federal legislation for goods moving in interstate commerce.

Is anyone worried that it is wrong to regulate airplane travel and train travel, food and drugs, and so on? We even regulate radio and TV, the size of peas in a can, and the colors of lipstick. The products of our schools certainly move across State frontiers—9 million families or more than 35½ million persons now move from one home to another each year and many of these moves entail shifts to schools in other school districts or States. Isn't honest labeling of educational diplomas as important as honest labeling of drugs? We regulate what goes into people's mouths, why can't we recommend what should go into their heads?

That education is not mentioned in the Constitution is simply due to the fact that it was not thought of as a State function at the time the Constitution was adopted.

Mr. Lester S. Vander Werf, dean of the College of Education, Northeastern University, of Boston, Mass., has said in a speech entitled "Federal Share in Education," that following the Revolutionary War there was much favor of a national system, and that between 1786 and 1800 several prominent Americans—Benjamin Rush, Samuel Knox, Nathaniel Chapman, Robert Coran, James Sullivan, and Noah Webster—wrote about or otherwise advocated a national system of education. Mr. Vander Werf also states that Washington and Madison were reputed to have advocated a national university.

Certainly, we have no evidence that Federal aid to education was then considered unconstitutional. The Federal land ordinances of 1785 and 1787 actually contain important provisions for education. the Supreme Court in the case of *Helvering* v. *Davis* implied that Congress had authority, by the general welfare clause, to make "reasonable financial support of items of major national concern like education." We have the Morrill Act of 1862, the Smith-Hughes Act of 1917, the Veterans Act after World War II, and the Defense Education Act of 1958. Congress is presently considering another bill providing

Federal aid to education. So actually we have been supporting education federally for a long time.

ESTABLISHMENT OF STANDARDS IN EDUCATION

Now as to standards: If you will study educational reforms carried through in the past in other countries, you will find that they have all centered on establishing standards. You can't read about these reforms without being impressed with the absolute necessity of setting standards by which the performance of schools and teachers can be accurately measured. Different countries have solved this problem differently. We have an unusual problem in this country and we must eventually devise our own way of setting uniform national standards; we must invent machinery which will do this and meet with public approval.

It must not be thought that it was easy to establish a national education system in England. Fear of Government tyranny could be overcome only very gradually, beginning with establishment of state, supported elementary schools.

The minute you set standards you also bring about an upgrading in teacher requirements, because when a community finds out its children are not getting the standard of education which should be taught at high school they can go right back to their school board and say, "Look, my Johnny can't read; he can't spell, and he can't meet the model national standard."

I have in my hand the Russian 10-year school examination that will go into the record. It has to do with algebra, geometry, physics, chemistry, foreign languages; the only subject mixed up with communism is history of the U.S.S.R. The others are not ideological subjects, they are plain brain subjects. The examinations are set by a body external to the child's school and are uniform throughout the country.

I should think we could use this set of examination questions in setting our own standard diploma examination, at least to the extent that we would not wish our children to know less than the Russians. But we ought to remember that, difficult as these Russian examinations would appear to the great majority of American high school students, even those taking college-preparatory courses, they would be child's play to the graduates of the European lycée or Gymnasium. For our most talented students we ought therefore to have an additional set of examinations which is more difficult than the Russian exams—one which would not be less demanding than those taken by the most talented of European children. Certainly, you won't want to say that our children are not as bright potentially as Europeans. Nor do I feel that we can long continue to say that "we don't need to have our children learn so much."

In the technological race we are in with the Russians, I fear that our children will indeed need to learn as much as European children of equal mental aptitude have learned for many, many years. Today wealth alone does not eliminate the need for education. Just because we are the wealthiest nation of the world does not mean that we can afford to give our children a less demanding education. Nations are somewhat in the same position as individuals: when a man has achieved success in life he does not usually educate his children less

because they will inherit his money; he uses his money to educate them better.

So, setting up permissive standards for the high school diploma would be the first thing for us to do if we really want to improve education.

If we did that we would go a long way toward beginning to solve the problem. There are many other things that could be done, but that, in my opinion, is the immediate one.

Mr. CANNON. Mr. Weaver.

RUSSIAN PROGRESS IN ATOMIC MARINE PROPULSION

Mr. WEAVER. From your observations what progress have the Russians made, compared with ours, in the field of atomic marine propulsion?

Admiral RICKOVER. I think unquestionably we are ahead of them; I dislike saying this because I am responsible for naval atomic propulsion, but as far as we know, the only marine propulsion plant they have is in the *Lenin*, and it has not yet operated at sea. We have had naval plants operating since 1953. Mr. Kozlov, when he was in the United States in July, told me that they are building atomic-powered submarines.

Mr. MINSHALL. Getting back to the question of education, I wonder if you would explain in more detail the reported practice of the Soviet Union in taking the smarter and more brilliant elementary age children away from their homes for the purpose of giving them an education and making them virtual wards of the state.

Admiral RICKOVER. There is a plan to do that for brilliant students.

Mr. MINSHALL. Are they doing it now?

Admiral RICKOVER. So far as I know they are not yet doing it.

Mr. MINSHALL. It has been reported to us they were doing it.

Admiral RICKOVER. I don't believe they are doing it yet.

Mr. WHITTEN. When we were in Moscow we were told that every student had to compete with probably 50 others to get into the Moscow University. We were also told that, since getting an education was a way to break the line and get away from Russian poverty and not just be average, competition was very keen among students who wanted to go on to school.

Admiral RICKOVER. They are graduating more scientists and engineers than we are. As I have said, in 1957 they had a total of 1,475,000 scientists and engineers as compared with 1,330,000 in this country. The fierce competition for admission to the universities is simply the obverse effect on the individual which comes when a society has a huge pool of well-educated citizens. Even in Russia they need only a certain number of trained professional people. The advantage their excellent 10-year schools give Russia is that these test every child as to his ability in any given area of knowledge. The university can then pick the very best for further training. But those who do not go to the university will use their good schooling in semi-professional jobs—they will become technicians of various kinds. I should guess that few graduates of the 10-year school end up doing manual labor.

Mr. CANNON. Mr. Pillion.

DISCUSSION OF IMPORTANCE OF ATTITUDE TOWARD EDUCATION

Mr. PILLION. I would like to get back to the question raised by Mr. Mahon. Is this not a matter of attitude, not only on the part of the students but on the part of the parents, on the part of the educators, and is not this attitude the same attitude that we find throughout the country in labor, where they expect to do about 4 hours work a day for 5 days a week, which means about 20 hours of work a week, so that we are not stressing production, we are not stressing science, we are not stressing efficiency, we are not stressing the buildup of this country, and this is supposedly a free country. How do the Russians instill or inculcate that desire and drive to build up the country that we do not have? Here everyone is looking how to make a dollar without working for it. How do you inculcate that drive? What is the fundamental way by which we can change the attitude not only of the teacher but the whole country?

Admiral RICKOVER. I am not sure that you can change it. If the Russian way of life were as easy as ours is today, I am not so sure that they would not have the same attitude. Nearly all of our ancestors were immigrants. Most of them had led a hard life in the old country; they were determined to see that their children lived better. Many of them thought that living better simply meant having more material possessions and working shorter hours at easier jobs. Now this is of course part of a better way of life. But the benefits one gets from being well educated are also part of a good way of life, in my opinion the most important part. We do not all recognize this. Apart from this personal benefit, it is simply a fact that today our whole way of life will depend increasingly on our having an educated general citizenry as well as highly specialized professional people. We shall need sufficient numbers of such professionals to maintain our standard of living in the face of diminishing resources in land and natural wealth. The disappearance of resources will lower our standard of living unless we offset this by being sufficiently ingenious to devise substitutes.

To this end, we need people who have been very well educated indeed; amateurish gadgeteering will not solve the coming technological problems for us. Even if we were willing to put up with lowered standards of material living we would need these professionals to keep us ahead of the Russians in the technological race. Today military power is almost wholly a matter of technology and this in turn depends on well-educated brainpower.

At present this is not obvious to many of our people. Parents make a good living without themselves having had a particularly rigorous education, and often without having to work very hard. If the father works a 5-day week, if he wastes his leisure time, if he goes on long vacations, how can he expect to convince his children they ought to go to school 6 days a week and for more than 180 days a year? Almost all Europeans go to school for 6 days a week for 240 to 280 days a year and in addition study many hours at home, so that the total time almost always exceeds what an American father puts in on his job. This is a real problem and I don't know the solution, unless parents use their leisure time doing important community work or improving

themselves. Somehow we must convince our children that their future depends on their really becoming educated. And we must convince the parents that a 180-day school year is not adequate. For example, Denmark has a 280-day school year. They not only have a 280-day school year, but they work much harder. Their students do on an average 2 to 4 hours homework daily. I believe the schoolday in the United States for primary and secondary school is 9 a.m. to 3 p.m. or something like that, with about three-quarters of an hour or an hour off for lunch. All of this waste of time forces our children to spend too many years in the lower schools. I do not believe it is wise to keep children in these lower schools so long, so I would make fuller use of the school year. I don't think that we could get as high as a 280-day school as in Denmark, but we might get up to 240 or 250 days, and we can certainly get a longer school day.

In Europe and in Russia they have an 8 to 9 hour "study" day and I would not be the one to claim that their children, because they work harder in school, are physically inferior to ours. The evidence is all the other way. Even shortly after World War II, a study found that European children, despite years of inadequate nourishment, were healthier than our own well-fed and pampered youngsters. I think if we could get comparable figures on draft rejection for physical deficiencies, we would find that ours would be higher. Our educationists profess great concern lest the health of our children suffer if school is made too hard. They haven't convinced me that a tough school program has adversely affected European or Russian children. I should make an exception for France though. Their standards seem to be too high for some of their children, and there is now some concern there lest the children's health suffer. Anything can be carried too far.

Most of our statistics comparing school attendance are pretty unrealistic for we don't factor in our short school day, short school week and short school year. In general, European schoolchildren go to school approximately until 15 years at a minimum; usually they will have about as many class hours of instruction by that age as our children at 17 or older.

In one way, Russia's low standard of living—it is about one-third ours—gives her an advantage in this matter. All Russians have to work hard. The Russian family, except for perhaps 1 percent of the people, works from morning until night to get enough to eat and to clothe and house themselves. Life is hard and they see the only opportunity for their children to get ahead is through hard study and hard work. Here, in the United States, parents feel they must treat children better than they were treated; that the children must have a better time than they had when they were young, without realizing that our high standard of living is based on rapidly digging out of the ground vast quantities of material which are gone forever. We are living off our resources capital without giving a thought as to what future Americans will do when they have to face up to real land scarcity and to inferior minerals and fuels that are harder to get at and more expensive to process.

We are not really benefiting our children when we encourage them to take it easy and have a good time at school. Those who are able to study for a professional career simply have to work twice as hard at college to make up for the time wasted in the previous 12 years of

schooling. At 18 when they could have a chance to broaden themselves, to absorb some general culture—all of it available at college—they must instead do remedial study in the subjects which everyone of similar ability abroad has already learned in the secondary schools. And let us not forget that the "teens" are a time when learning is absorbed easier than later on in life. It seems to me that we must change our attitude as to what constitutes the "good life" and realize that to become well educated enhances the human personality and makes life more interesting; it also gives one greater versatility in the ability to do things, including earning a living.

Mr. CANNON. Mr. Andrews.

Mr. ANDREWS. Admiral Rickover, you stated a few moments ago that there were three things necessary for the proper rearing of a child—a good home influence, school influence, and church influence.

Admiral RICKOVER. Yes, sir.

Mr. ANDREWS. What church influence do the Russian children get?

Admiral RICKOVER. The Communist ideology takes the place of the church influence in Russia. Communism is their church. That is a part of their training. That is what they get as religion.

The home influence, insofar as it stresses the value of a good education and urges the child to study hard, may be better than it is here.

Mr. ANDREWS. How do you think that ideology influence compares with the church influence a child gets in America?

Admiral RICKOVER. The church in the United States and in all Western civilization influences people to be kind, to love one another, and to be charitable. I do not think that you get that in Russia to the extent we have it here.

Mr. CANNON. Mr. Thomson.

PREPARATION AND QUALIFICATION OF TEACHERS

Mr. THOMSON. You discussed very briefly the preparation of teachers and their qualifications. Our system is quite frequently criticized because of spending too much time in teaching people how to teach rather than teaching them the subject matter to be taught. What is your observation as to the two systems?

Admiral RICKOVER. You have stated it exactly. The Russians, as well as other western European countries, stress pedagogical skill, but it outweighs all else only in kindergarten and perhaps the first 2 to 3 years of schooling, when it is needed to introduce the young mind to the world of systematized knowledge. I should say that up to about the fourth or even the fifth grade perhaps our teachers probably are as good as those in northern and western Europe. This probably holds true in comparison with European teachers in the lowest secondary schools for the least able children up to perhaps grade 8. But in the middle schools and the academic secondary schools, European teachers are far more highly trained than American high school teachers. They have had an education comparable to that of a lawyer; that is, they have had a general education approximately equal to that required for a B.A. in an American liberal arts college. Thereafter they have had some 3 to 5 years of university study in their special subjects—three of these subjects are required to teach in the middle grades, and very deep specialization in one of three subjects is required for teachers of the last three grades.

In intellectual ability and length and rigor of training, European elementary, middle school and academic secondary school teachers differ considerably and their salaries are comensaurate to their ability. There are, however, possibilities for an able teacher to continue studies part time and move into a higher category. In almost all advanced European countries the standard of educational preparation is set nationally, but selection of individual teachers is usually left to the communities. This maintains a uniformly high standard of competence—thus insuring equality of instruction to all children, regardless of the school attended—while permitting localities to select teachers on a basis of community preference for particular personalities.

In this country we have no uniform national standard for teachers. Russian teachers in the higher grades have had a more rigorous course of professional education than American public school teachers.

Mr. CANNON. Mr. Boland.

INSUFFICIENCY OF ENGINEERS AND SCIENTISTS IN UNITED STATES

Mr. BOLAND. The big concern, and the real comparison between education here and in Russia, is education with respect to the sciences, physics, and engineering. Now, the big complaint is that we are not doing enough in this area; we are not turning enough of them out. Are we not getting enough out for our own purposes? They started from scratch with the result that their development had to be more rapid and as a consequence they are graduating more engineers each year, but are we not doing enough for our own purposes? If ours was the kind of government that Russia is, where we could direct the efforts of these people that graduate with knowledge of the sciences into the particular areas into which Russia directs her efforts, then the problem here would be solved completely. We have the competent engineers and scientists but we spread them all over the Nation and into all kinds of industry, and that is something that does not occur there, is that not so?

Admiral RICKOVER. If we had no competition, it would not make any difference. If we had friendly oceans between us that could not be traversed in a few minutes by weapons that can destroy us, it would make no difference. But today we are in competition. We say that we can get an adequate number of scientists and engineers for our particular purposes, but our purposes are dictated and governed largely by what other people do just as much as the Russians' interests and purposes are dictated by what we do.

Mr. BOLAND. In the light of what you have said, would you say that we are now getting enough scientists and engineers and physicists to do the job we are called upon to do?

Admiral RICKOVER. No, sir; we are not. I stated before that by 1961 the Russians will have 2 million scientists and engineers, and we will have 1,600,000. Ours is not merely a deficiency in quantity; it is a deficiency in quality as well. We do not have sufficient numbers of scientific and technical people who are good enough in their particular fields and who also have a broad liberal education. Without a broad liberal education such people remain narrow specialists, and they are not as useful to our Nation as they could be. Also, the Russian scientists and engineers don't, 4 or 5 years after graduation, go into business and become sales managers. There are no sales campaigns

in Russia. They don't need sales managers, so Russia doesn't have the steady drain on her professional people that goes on here.

Too many engineers in this country are really only technicians; we do not have enough first-rate engineers. So when they have a larger number than we have, they actually have a larger number who can be used for science and engineering.

Mr. CANNON. Mr. Santangelo.

JOB OPPORTUNITIES FOR UNIVERSITY GRADUATES IN RUSSIA

Mr. SANTANGELO. In the United States when a person completes his education in the university, of course he finds himself faced with the problem of getting a job. What is the situation with respect to a Russian university graduate when he has completed his studies? Does the state provide that person with a position at a good salary, or a responsible job opportunity?

Admiral RICKOVER. Yes, sir, the state does. Today there is a great scarcity of competent people for the jobs that have to be done. Because it is a rapidly developing country, there is no dearth of jobs for qualified people. There is a place for every graduate of a university.

Mr. SANTANGELO. The State provides that?

Admiral RICKOVER. Yes, sir.

Mr. SANTANGELO. So the drive to obtain an education is regarded at the end of the road by a higher position than they theretofore would have had.

SALARIES OF ENGINEERS AND SCIENTISTS IN RUSSIA

Admiral RICKOVER. Yes, sir. The engineers and the scientists are well taken care of in their scheme of things. In fact, the highest paid person in Russia is the head of their Academy of Sciences. I think he gets 100,000 rubles a year. Would you care to hear something about the salaries that exist there?

Mr. SANTANGELO. I think it would be interesting.

Mr. FORD. What does 100,000 rubles a year mean?

Admiral RICKOVER. For 100,000 rubles a year you can have everything you want. It is probably the equivalent of about $50,000 here, when you consider that high officials get a free car and chauffeur, a country house, various other perquisites, and so on.

Mr. JENSEN. Did you say we will graduate 1,600,000 people this year in the sciences and they will graduate 2 million?

Admiral RICKOVER. No, sir. I said the number of high school graduates in our country and the number of graduates from the Russian secondary schools happens to be about the same in 1957—1,600,000 in Russia and 1,458,000 here. I said that by 1961 they will have about 2 million scientists and engineers, while we will have only 1,600,000.

Mr. JENSEN. But they put great emphasis on the sciences. Do you not think they are overdoing it to the extent that they are not teaching the things which are basic to the strength of a nation economically?

Admiral RICKOVER. Mr. Jensen, if we were all alone in this world and could work out our own destiny without being bothered by anyone, we could do many other things. But suppose you are the most cul-

tured, the most educated, and religious person in the world and you have the greatest degree of freedom, and suppose there is somebody opposing you who is not as fine a person as you, but who is 2 feet taller than you are and who is much stronger than you are and gets into a fist fight with you, who is going to win—regardless of all your good qualities, regardless of your great faith and charity and everything else? This is the situation we are faced with.

OPPORTUNITY FOR EDUCATION IN RUSSIA

Mr. JENSEN. The forces of the Devil never have been and never will be the victors over the soldiers of the cross so long as God is in his Heaven. I have one more question. We are told that a great number of the Russian children do not even have an opportunity to go to school. Do you believe that to be true?

Admiral RICKOVER. No, sir. That is not so, Mr. Jensen. This is a fallacy which has been spread in this country.

Mr. JENSEN. How about in Siberia?

Admiral RICKOVER. The majority of Russian children do not have an opportunity to go on to university, but every Russian child not only has an opportunity to go to school, in fact, he must go. Look, as I have said, we have 7 States in this country that require compulsory education for only 8 years, 33 for 9 years, 7 for 10, 2 for 11, and 1 for 12 years. There is a 7-year compulsory education all through Russia now, and by 1961 it will be 10 years. It is a fallacy to believe that all Russian children do not go to school.

Mr. JENSEN. I speak at many high schools, to groups of high school students, and I am always agreeably surprised to know how well informed they are in all matters pertaining to the sciences. They amaze me with their knowledge in this field.

Admiral RICKOVER. It would be interesting to see if the high school graduates in your district can pass the Russian 10-year examination.

Mr. CANNON. The gentleman from Illinois.

QUALITY OF RUSSIAN ENGINEERS AND SCIENTISTS

Mr. YATES. In the hearings before our Subcommittee on Independent Offices, we had the scientists from the International Geophysical Year, some of the most eminent in the country. Various members of our committee asked them questions about the competency and ability of the Russian scientists. Almost unanimously they said the Russian scientists were people of the highest quality. Yet some of the members of our subcommittee thought that at least in the fields of rocketry and missile research the great strides taken by the Russians were attributable principally to the fact that they had captured German scientists during the war.

My question is this: In your contacts with the Russian scientists and engineers, particularly in the field of atomic engineering, which is your specialty, did you gain an impression of the quality of Russian scientists and engineers?

Admiral RICKOVER. Yes, sir. From the contacts I had with them I thought they were quite competent people, and certainly they have not learned their nuclear business from the Germans, because the Germans have little of that today.

Mr. BOYLE. Will the gentleman yield?

Mr. YATES. Yes.

Mr. BOYLE. As a matter of fact, isn't it a common misunderstanding to assume that Russia has been so far behind in rocketry? Wasn't there a Tsiolkovskii who was the Russian father of space and who wrote a book in 1903 and invented a sky ship?

Admiral RICKOVER. Yes, sir. He wrote "Investigation of Universe Space" in 1903. I also know that to date the Russians have orbited the heaviest object into space. If you are behind when you do that, then backward is forward.

Mr. YATES. Your impression is that they have tremendously competent people?

Admiral RICKOVER. Yes, sir. They have very competent people. And they are graduating many more. This is the real point I am trying to make here.

Mr. CANNON. Mr. Natcher.

NEED FOR GREATER EDUCATIONAL OPPORTUNITIES IN UNITED STATES

Mr. NATCHER. Admiral, as you well know, we are spending some $40 billion a year for national defense. You also know of our difficulty each time we bring a bill to the floor which pertains to school construction. Admiral, I for one do not believe that the construction of school buildings will correct our educational deficiencies. What did you see during your travels in Russia which indicates that we are not spending enough for national defense, that we are spending too much, or that we should spend some of this money in our educational system?

Admiral RICKOVER. I would rather not get into national defense, because all 50 members of the House Appropriations Committee are greater experts than I on national defense, and far be it from me as a recipient of the bounty of this committee to say one thing or another.

But I will say this about the schools: Their schools are very austere. If we stopped putting up beautiful school edifices, with all the shops, assembly halls, playrooms, and so on, and built more austere buildings instead, we could use the money we saved for real education of our children, and we would not need as much Federal aid to education.

I am not saying we should not have Federal aid to education. I do not want to be in the position of arguing that.

I do say that regardless of who has to supply the money, every child in this country, no matter what State he comes from, whether from the noble State of Missouri—and I start off with the chairman's State—or whether from Mississippi or Illinois, should have exactly the same opportunity to get the best education possible. This we do not do, because some of the States are too poor to support schools adequately. A child in South Carolina is just as valuable to me as a child in California, and should have the same educational opportunity. As it is, the school districts vary in taxable wealth and this necessarily reflects on the quality of public education. The richest school district in California has 10,000 times the taxable property of the poorest district in that State. Naturally, a child in the richest district will have a better educational opportunity than in the poorest one.

Every boy and girl in this country regardless of where he lives, regardless of his social status, whether his father is rich or poor, should have the same opportunity for a good education. We believe in democracy and we talk a great deal about it. I think it is the most undemocratic thing we do when we make educational opportunity for our children a gamble—when it depends on where his parents live. This is unequality of opportunity.

IMPORTANCE OF INCREASING SALARIES OF TEACHERS

I would certainly make it possible for every child to have the same educational opportunity. We can argue this thing constitutionally or from the standpoint of the individual but what I say to this committee today is that we are really arguing about the survival of the United States. And while we are arguing precious time is lost and we fall back still further in the educational race. We have to make a start toward upgrading our schools. Even if we started today it would probably take a generation until we had thoroughly reorganized our public education. You can't change an educational system overnight. The teaching profession should be the most noble in the land. Unfortunately, although there are a few dedicated people who will work without adequate compensation, we cannot expect them to do that indefinitely. The best and simplest thing is not just to give more scholarships but to increase the pay of teachers. What is the use of sending a lot more children to college if we don't have properly qualified teachers to teach them? We are losing qualified young teachers because of low salaries. There are many people in industry and in laboratories who would like to teach; many people would rather teach than do the work they are doing now. You know the real shortage in engineers and scientists is not so much in numbers as in quality. Many people who are in laboratories doing work ultimately paid for by the Government should really be teachers. Particularly men. The boys need male teachers. If we could raise the salaries of the teachers high enough, I am sure we could get many of these people. A university professor in Russia is paid the same as a commissar or the head of a large industrial organization.

I would have direct Federal aid to teachers. That is important. I would set up some sort of standard for teachers. If a teacher met that standard, I would give money directly to him, and not pass it through all these grasping bureaucratic hands that you have all the way in the process between the time Congress appropriates the money and the time it does some good.

Mr. CANNON. Mr. Michel.

NEED FOR SETTING OF EDUCATIONAL STANDARDS BY FEDERAL GOVERNMENT

Mr. MICHEL. Admiral, in further clarification of your response to Mr. Natcher, my original question, which was phrased to be in clarification of your response to Mr. Mahon, was simply this: Are you suggesting that we should move away from the traditional autonomous local school board? In your opinion, what is the position of the Federal Government relative to education? Is it simply a matter of setting standards?

Admiral RICKOVER. Today it should be simply a case of setting standards. We have 57,000 individual school boards in the United States. There are simply not enough competent people to man 57,000 individual bodies.

Interestingly enough, the first major reform made in England when they started building up a national school system was to reduce the number of school boards from 3,000 to 256. It was felt that a larger local education authority would have access to more lay talent and could do a better job. If we had a corresponding number of school boards per capita in this country we would have 1,000 instead of our present 57,000. I believe it is completely unworkable to depend on 57,000 school boards with their own individual ideas to have a proper system of education in the United States.

Why do we consider it more democratic to leave this vital national problem in the hands of 57,000 local communities; or, for that matter, why do we trust the legislatures of the 50 States more than we do the Congress? In actual fact, the higher you go in government, the greater generally the capacity, integrity, and performance of the men elected to office.

Nevertheless it would be impossible politically today to get a mandatory criterion in the United States. But we could get a statement of policy, "This is what we think is a good education," that would give parents a norm. They would have something they could bite into. They would have a yardstick to measure what their children should learn and have learned in school. That is about as far as you can go right now.

Mr. MICHEL. You think the Congress ought to take that step?

Admiral RICKOVER. I certainly do, sir. The Congress traditionally has looked out for the people.

Mr. MICHEL. One further question, if I might, Mr. Chairman. Do you think as an intermediate step it is feasible for the individual States to set somewhat a standard?

Admiral RICKOVER. You would do much better if you set a national standard, because the States again would have different standards. The English example shows that one does not have to have a powerful ministry of education to set a high national educational standard. But it takes ingenuity to devise an alternative method. Where the English use the inspectorate and the national grant to keep educational levels uniformly high, most European countries prefer to have a national ministry of education with power to set standards for schools and for teacher qualication. But in England as on the Continent, the ultimate standard setters are the universities because the goal of the best secondary schools is to prepare students for entrance into the universities. We are coming to something of this sort here too.

PROBLEM OF STANDARDS OF PUBLIC AND PRIVATE EDUCATION

Because of the rapidity with which our population is growing, and the length of time it takes to provide additional college space, it becomes each year more difficult for high school graduates to get into the really good colleges. The only democratic and fair way for the colleges to choose among a surplus of candidates is to raise admissions

standards. They are therefore making more and more use of the college entrance examinations. And so, in a way, these examinations are beginning to set a standard at least for those who take the college preparatory courses in our high schools.

For example, 10 years ago only 75,000 students took the scholastic aptitude tests and only about 30,000 of these also took the achievement tests; 5 years later the number of students taking scholastic aptitude tests had doubled. The College Entrance Examination Board recently informed me that they expected 300,000 to take the scholastic aptitude test this year and 125,000 the achievement test. Ten years ago only 79 colleges were members of the board, whereas today there are 250.

As it gets harder to be admitted to the limited space in good colleges, the student whose high school does not provide a good college preparatory course misses out. This naturally affects the children of poor parents more than those of rich parents. The huge comprehensive schools serving a locality with many poor parents almost always have poorer college prepatory courses than those in high-income neighborhoods. There will be fewer students enrolled in such courses and our false notions of democracy will therefore tend to concentrate school resources on the type of vocational and know-how subjects favored by the majority.

If public schools are deficient, rich parents have the means to send their children to expensive college preparatory schools; the graduates of such schools are far more heavily represented in the freshman classes of our best colleges than their proportionate numbers would justify. That they got into college was often less because they were brilliant than because they had received a better secondary education than public high school graduates. Of the latter only the intellectually well endowed and strongly motivated get in, which shows up in the fact that after the first 1 or 2 years, they usually surpass the preparatory school students.

Half a century ago, the best education in England was limited to a closed educational circle where the children of the upper classes went to the so-called "public" schools and were taught there by teachers who had themselves gone to these schools and had then gone on to Oxford and Cambridge. Students and teachers moved within the charmed circle of public school, Oxford and Cambridge; few outsiders ever broke in.

If we continue, in the so-called name of equality, to make public education so easy that everyone can get through, we may yet come to a situation resembling that of England at the turn of the century, with a closed circle polarized by the private preparatory school and the ivy league college. Therefore, unless we make our public education tougher, unless we upgrade our public schools substantially, the poor children will not be able to get into a good college. I am concerned that an equal opportunity for all our children to mount the educational ladder will be lost. But I cannot see how this can be helped unless the schools provide a more rigorous curriculum. If we make the high school too easy, we shall in effect bar many gifted children from college.

If we had an adequate public school system we wouldn't need so many private schools. The number of private schools is increasing primarily because many parents are dissatisfied with our public schools. This is

a free country. No educationist can force a parent to send his children to schools where they don't get an education the parent considers good eough—that is, if the parent can find the money to send them to a private school. But this, of course, introduces class privileges into education. It makes it undemocratic.

Educationists like to confound their critics by claiming that European education is class education while American education is mass education. But it is a curious fact that except in England, which came into public education at a very late date, practically all European children—rich or poor—now go to the same tax-supported schools. These schools are free and anyone can get into them if he can pass the requisite examinations.

England, which got into tax-supported education much later than the continental European countries, still has many private boarding schools attended by the children of parents who can afford the high fees and who regard them as superior to the state schools. Although the educational ladder is wide open in England, the preference of the upper classes for private schools introduces an undemocratic element into education there. If our public schools do not improve, we may find that we shall eventually have a similar situation here. Well-to-do parents will send their children to good private college-preparatory schools where they receive an education that gives them an advantage in the severe competition for admission to the better colleges. Even today the number of preparatory school youngsters over high school graduates in the freshman classes of our best colleges is way out of proportion to their relative numbers.

Mr. CANNON. I am impressed by what you have just said about the relation between public and private schools. Will you please amplify that point.

Admiral RICKOVER. We must not, in the name of absolute equality of education, get an undemocratic system of education here where the poor go to the public high schools and the rich to the private college-preparatory schools; where State universities that are not allowed to select among candidates for admission will get the least able poor and our best private colleges will get the most able rich. We must not let this happen. We must preserve the principle of equal educational opportunity for all children. The only way is to upgrade our public schools.

Today in England and on the Continent of Europe the gifted child of poor parents can move up through the secondary schools free of charge and is seldom prevented from entering a university because of lack of tuition money. If we do not upgrade public education, we shall in time become educationally less democratic than almost any other advanced industrial nation. The trend is already clearly evident; if we keep on letting our children take it easy, if the parents let them get away without studying, those children will simply not be able to get into college.

Now I can argue this from the standpoint of the child himself, or I can argue it from the standpoint of national need, and it is the latter than I am addressing myself to this morning. I say that we in this country cannot afford to waste this potential. We could when we were a pioneer country and when we were protected by friendly oceans. We can no longer dissipate our mental resources.

That is the essence of my argument—that we must do this for national survival.

Military defeat has in the past led nations to reorganize their public education. Prussia did this in 1806 after she had been defeated by Napoleon; France did it in 1871 after her defeat by Prussia. But it is risky to wait that long before taking the necessary steps to bring one's public education up to par.

Mr. CANNON. Mr. Norrell.

Mr. NORRELL. Mr. Chairman, the question I desire to ask the admiral is this:

INDOCTRINATION OF RUSSIAN PEOPLE THAT UNITED STATES WANTS WAR

I know you met a goodly number of outstanding Communists while you were in Russia. Do you believe that any Communist leaders you met in Russia really and truly do not believe that the American people actually and truly want peace? What do you think about that?

Admiral RICKOVER. I know only what they said. Practically every one of them indicates and has said to his own people that the American people want war. Nearly all of the Russian people are indoctrinated in that. Whenever any member of our party talked to the Russian people, the first thing they said was, "Peace. We want peace. Why don't you also want peace?" So while it is obvious that the Russian people want peace, it is equally obvious that they have been indoctrinated by their leaders that the United States is the one that wants war.

Mr. CANNON. Mr. Passman.

USE OF FOREIGN AID FUNDS FOR EDUCATION IN OTHER COUNTRIES

Mr. PASSMAN. Admiral Rickover, I might preface my remarks by stating in the beginning something was mentioned about foreign aid, and what foreign aid has accomplished in Poland, although Poland is not a foreign aid country. But this is the question: If we have an inferior educational system, our system compared to Russia's, do you think it would be wise for this country to continue spending money in some 76 of the other 86 nations of the world trying to educate people with a system which in competition with Russia is not as good? What do you think about that?

Admiral RICKOVER. I would rather not get involved in that. That is getting me pretty far afield from my competence.

Mr. PASSMAN. I ask the question only because in the beginning you pointed out what had been accomplished in Poland with foreign aid.

Admiral RICKOVER. It was pointed out by another member of this committee, Mr. Whitten, that actually there was no formal foreign aid, that most help until recently was in the form of food and clothing from relatives and friends. I was merely trying to get one point across, sir: that everyone in our party felt very proud to be an American when he saw the great warmth people showed toward the United

States. We knew it wasn't addressed to us as individuals. We knew it was being addressed to us as representatives of the American people.

This is all I was saying. As to what we do about foreign aid, I would like to stay out of that because that is a partisan issue. Whether we give aid or not, I am merely telling you what I saw in Poland.

Mr. PASSMAN. It is not a partisan issue. Both parties support the program. But if we have an educational system which in competition may prove inferior to that of Russia, should we not bring some of that money home and first educate our own people, rather than go out and try to educate others throughout the world?

Admiral RICKOVER. I do not believe there is any real competition for money between foreign aid and education, sir, when we are so well off and when we are spending only $17.6 billion a year on public education, which is about 4 percent of our current gross national product. I do not think it has to be either one or the other. I have expressed the opinion any number of times that if there was no other way of getting money to educate our people adequately I would take it from the Defense Establishment.

Mr. PASSMAN. A final question, Mr. Chairman.

SPORTS IN RUSSIAN SCHOOLS

To what extent are the Russians going in for sports—such as football, basketball, track, and all that?

Admiral RICKOVER. They go in for physical development in the schools. They do not go in for organized athletics in their schools. The only organized athletics they have is international athletics, and that is a matter of national prestige.

Mr. PASSMAN. They have been very successful in competition, have they not?

Admiral RICKOVER. Yes, sir. But no schoolchild would ever be permitted to waste his time in school training to be a star on the school's football team so that the team could then entertain the adult community. Physical education in Russia—as in the rest of Europe—is centered on developing the body of each child, on the old principle mens sana in corpore sano. Organized athletics with huge interschool and intercollege games in which only a handful of star athletes take part are a distinctly American phenomena, unknown elsewhere. They do not serve the same purpose as physical training abroad, or at least only marginally so.

POST-WAR U.S. ASSISTANCE TO POLAND

Mr. MAHON. Mr. Chairman, in view of the fact that the question of aid to Poland has been mentioned, would it not be proper to insert in the record at this point a statement in regard to the aid, through loans and otherwise, which has been provided to Poland?

Mr. CANNON. It will be inserted at this point.

(The information follows:)

Total postwar U.S. assistance to Poland, as of June 30, 1959

[In millions of dollars]

Fiscal year	Mutual security program	Public Law 480		Export-Import Bank	Surplus property	UNRRA	Miscellaneous	Total
		Title I	Title III					
1945-50				[1] 40	37.7	364	[2] 0.9	442.6
1951-56								
1957	30	18.4						48.4
1958	25	119.8	0.5				[3] 0.4	145.7
1959	6	44.0	2.5					52.5
Total	[4] 61	[5] 182.2	3.0	[1] 40	37.7	364	1.3	689.2

[1] Poland has repaid the following: $12,304,000 principal; $12,196,527 interest.
[2] Includes $0.1 lend lease support and $0.8 American Red Cross support.
[3] Includes $0.3 for surplus agricultural commodities distributed through private welfare agencies, and $0.1 ocean freight charges.
[4] Financed by allotments from appropriations to President's contingency fund, special assistance and contingency fund in fiscal years 1957, 1958, and 1959, respectively. These MSP funds were allocated to Export-Import Bank for implementation of the program.
[5] Represents total value of sales agreements at world market price.

Mr. CANNON. Dr. Fenton.

DISCUSSION AND DESCRIPTION OF THE RUSSIAN HOME

Mr. FENTON. Admiral, did you have the opportunity to visit the homes of the common people there?

Admiral RICKOVER. Yes, sir; and completely unsupervised. I visited various types of apartments and homes. I also visited ladies' hairdressing establishments, grocery and tailor shops, food markets, lock and tinsmith shops, churches, dry cleaning establishments, second-hand clothing stores, offices, and department stores: I talked with everyone. They all answered freely.

For the common man, life is hard in Russia. There is enough food. There is adequate clothing although the people must work hard to obtain this clothing because prices are very high. There is just a bare minimum of housing. For professional people, Government and industrial leaders, artists, and writers, life is not at all bad. For some it is downright luxurious.

It seemed to me that the Government, as a matter of policy, kept the cost of clothing and shoes artificially high. In this way, surplus purchasing power which might be used to buy other consumer goods was being taken away. In most of Russia the climate gets pretty severe, so adquate clothing is essential. By making the cost of clothing very high, nearly everybody has to work hard.

Mr. FENTON. The reason I asked that is that in my time I have brought into this world a great many children, and in almost all of those instances the parents, particularly the mothers, looked with a great deal of pride on their offspring.

In what order do you place home training, education, and religious training? Which do you think is paramount?

Admiral RICKOVER. You are asking me a subjective question. All three are important and can be taken care of properly if the children are not permitted to waste their time.

Mr. FENTON. Of course, home training and religious training would certainly be very much observed had you gone into the common homes.

Admiral RICKOVER. I think there is no conflict among them, sir. As I said earlier, I believe the difficulty in our country is that we expect the schools in a few hours a day and in 180 days a year to take over the entire job of raising a child. This is the real difficulty. If the home does its job, if the church does its job, if the school does its job, and if the children do not loaf and just have a good time during their teenhood, we could accomplish all three.

Mr. FENTON. Up to the time of going to school, I think the home training and religious training should enter into the picture a great deal more.

Admiral RICKOVER. When we start discussing religious training, I can only speak in generalities: that the home and the church are responsible for training the child to live as a member of society. In savage societies, there is actually a time of initiation where the child is tested as to whether he is ready to become a member of the adult society. Few civilized societies now follow that practice. It is my contention that the primary function of the school is to train the intellect, and not to train the boy or girl to become a member of the adult society insofar as religion and home training are concerned. The school can perform all three functions only when it has the child for 24 hours a day, as in boarding schools.

Mr. CANNON. Mr. Fogarty.

THE PUBLICATION, "EDUCATION IN THE U.S.S.R."

Mr. FOGARTY. When you opened your remarks, Admiral, you mentioned a booklet put out by the Office of Education. Were you referring to this one [indicating], "Education in the U.S.S.R."?

Admiral RICKOVER. If it was written by Miss Lowman for the U.S. Office of Education that is the book.

Mr. FOGARTY. It is put out by the Office of Education.

Admiral RICKOVER. Yes, sir; I believe that is the one. Miss Lowman was a Russian expert working for some other Government department—I believe in intelligence. There was no one in the Office of Education who knew Russian and was qualified to do the job, so she was engaged to write the book.

After she finished writing the book and it had been checked by various Russian experts in other Government departments, she was dismissed by the Office of Education. The editing was then taken over by the Office of Education and in the process about half her material was thrown into the wastepaper basket. She was not even allowed to see the edited manuscript before it went to the printer. When she saw it finally at her own request and suggested changes, it was too late. Miss Lowman has described her experiences with the Office of Education in an article and in interviews with the press. I am not aware that her accusations of rather highhanded treatment by the Office have ever been refuted or adequately explained by them.

Mr. FOGARTY. What fault do you find with this particular publication?

Admiral RICKOVER. There was left out the great emphasis placed by the Russians on teacher training. Also, there was left out a bibliography by which readers could have looked up the original sources. Miss Lowman wrote:

Much valuable information on Soviet education especially included in the manuscript at the request of the Department of Defense, the Committee for the Development of Scientists and Engineers, the National Science Foundation, and intelligence agencies in the Government—to name a few—was deleted.

Many paragraphs were reworded, resulting in errors; the chapter on administration of Soviet education was cut up and an explanatory chart left out; the financing of education was reworded, leaving out the important fact that Russia spent over 10 percent of her national income on education at a time when we spent but 3 percent. I could go on. It was quite an editing job, done by persons who apparently knew little about Russian education, who may have had an ax to grind, and who do not appear to have been skillful editors. They showed extraordinary discourtesy to the person who had done the actual job, both in cutting up her book without letting her even advise them on what should be omitted and in failing to give her the proper credit. I do not know Miss Lowman, but I am thoroughly familiar with the ways of bureaucracies and I do not think we should allow this sort of thing to go on in a tax-supported agency of Government.

DISSEMINATION OF INTERNATIONAL EDUCATION INFORMATION BY OFFICE OF EDUCATION

Mr. FOGARTY. In the Office of Education they do have what they claim are experts in international education. They have had such employees for a number of years. Do you think we have been wasting a lot of money on this particular phase of the Office of Education?

Admiral RICKOVER. The Office of Education was initially set up to collect and disseminate educational information and statistics. They have certainly fallen down on the job of alerting us as to what goes on in the schools of other countries. The whole question of our relative standing compared to the Russians was not brought out by the people in the Office of Education. It was only last year that they started putting out pamphlets about education in other countries. They did this as a result of the goading they got from critics of American education.

Mr. FOGARTY. The last 2 or 3 years, especially since Dr. Derthick has been Commissioner of Education, they have been sending teams of experts to Russia and other European countries, so they tell us.

Admiral RICKOVER. It is my understanding that the first official educational visit to Russia took place last summer. But news of the Russian educational menace has been appearing in American and foreign journals from 1953 onward. It seems to me they were a bit late going over there and finding out what foreign schools were doing.

Mr. FOGARTY. They return with these statistics and recommendations to the Office of Education. Do you know of any instance where recommendations have been made to the Office of Education which for some reason or other have been concealed?

Admiral RICKOVER. No, sir, I do not. I believe the Office of Education has the same kind of people there are in the National Education Association, which is a private organization. There is a vast bureaucracy of these "life adjustment" people who control our primary and secondary schools. They are in the foundations, also. When a man criticizes education in the United States, he never even gets through to the schools. He has this vast curtain, this whole screen

of people who make a living off it to contend with. There are many vested interests in education.

Mr. FOGARTY. Dr. Derthick is not in that category. He has been there only 2 or 3 years. He comes from a family of educators. I happen to be quite impressed with his ability.

Admiral RICKOVER. I know nothing about him personally except that before a Senate committee and in public statements he asserts it to be his conviction that the best schools in our country are unsurpassed anywhere in the world. With this I cannot agree. Nor do I share his apparent belief that electives are a necessary part of "democratic" education, or that local control of schools is essential in the sense that a national standard for a high school diploma would violate our basic principles.

Mr. FOGARTY. Do you think the Defense Education Act is doing any good?

Admiral RICKOVER. Yes, sir, it is doing good. I do not think it is doing as much good as the money appropriated would permit because you entrusted its spending to this same group of characters.

Mr. FOGARTY. Who are some of these characters? What kind of people are they?

Admiral RICKOVER. They are the progressive educationists. They believe that the function of the school is to train children in all these frills and know-how subjects and not in hard mental work.

Mr. FOGARTY. We have been given the example this year of a president of a university in Ohio saying that freshmen last year seemed to be better educated than the freshmen of 25 years ago.

Admiral RICKOVER. I personally doubt that very much. I like to be objective. I have shown you a set of examination questions which are given to Russian high school students. I suggest you take those questions and see how many high school graduates in this country can pass them.

Mr. FOGARTY. I am trying to be objective, too, because it is our responsibility to provide funds for the Office of Education, and if they are not doing the job, I think we should find out about it.

Admiral RICKOVER. It is not up to me to find out, sir.

Mr. THOMAS. Mr. Fogarty, will you yield briefly?

The Office of Education has no duty or responsibility to go down in Mississippi or Texas and tell those people how to run their schools. They do not have that authority.

Mr. FOGARTY. I am talking about what is going on in Russia and what we should be learning from them with a view to improving our own system if it is shown that ours is weak in certain respects. We have an international division in the Office of Education that is supposed to have some expertness in that area.

Admiral RICKOVER. The Russians adopted some of the progressive educational philosophy after the 1917 revolution. About 1934, when they found out they weren't getting trained prople with that system and that they wouldn't be able to industrialize their country unless they had competent scientists and engineers, they threw the progressive system out of their schools, lock, stock and barrel and changed over to the western European educational system.

I urge you to ask the Office of Education if they were the ones who found this out and reported it. They have lots of psychologists and sociologists in that organization, people who have had that sort of

training. Why did it take a few individual critics to report this Russian education reform and cause this big stir? Why wasn't it done by this organization for whom Congress has appropriated money all these years to keep the Congress and the American public apprised of what is going on in education? That is the question I would ask.

Mr. FOGARTY. With regard to this booklet—with the exception of leaving out or editing out how hard the teachers work in Russia——

Admiral RICKOVER. And their method of selection.

Mr. FOGARTY. Have you any other fault to find with this?

Admiral RICKOVER. It has been about 2 years since I read it. I do nor remember the details. I would have to check it once more.

Mr. FOGARTY. At that time did you think it was fair?

Admiral RICKOVER. At that time it was obvious they had left out some of the report. Otherwise it is a helpful study in that it certainly shows there was a great deal of progress in Russia which had not been reported. It was the first official report by an American governmental agency to show that. From that standpoint, it was very good. I think they ought to get a new objective report out now.

Mr. FOGARTY. One final question. I think you said a while ago that all babies are born savages. What is your definition of a savage?

Admiral RICKOVER. I would define as savage a person who is interested only in himself and his personal wants; who is not amenable to social laws, recognizes no rights of others, accepts no obligations himself. He is ignorant about everything he cannot personally observe and has no self-discipline. All babies are born savage; we devote infinite care to helping them become civilized.

DEFINITION AND DISCUSSION OF AN EDUCATED MAN

Mr. CANNON. In contrast, what is your definition of an educated man?

Admiral RICKOVER. This is a difficult definition, sir. Plato wrote several books touching on that subject, but I will see what I can do in a short time. I think an educated man—this is one of many definitions—is a man with broad knowledge in all the fundamentals that make the world around him intelligible; a man whose mind has been sharpened so that he can use it effectively. He accepts ideas, thinks about them, imparts something of himself into them, and comes forth with something new. Because of his broad general knowledge, the educated man sees things in perspective, in relation to other things and in an interconnected way.

The uneducated man, who knows little about the forces which shape the world around him lacks this ability to see things in their relation with other things. He is like a mirror; he does not absorb ideas, he merely reflects them. Each thing stands alone for him. He lacks the ability of the educated man to join different ideas and bring some sort of order into them. Ability to withdraw into himself and think things out independently is perhaps the educated man's most important attribute. A famous philosopher calls this ability to withdraw into oneself and think things out the most significant characteristic distinguishing man from animals. This characteristic is developed through education. The uneducated have it to a much less degree than the educated. The Spanish philosopher, Ortega y Gasset says

somewhere that some people are a bit like a seal who sleeps for a minute and a half, wakes up, takes a quick look at his surroundings and goes back to sleep again. He either sleeps or he looks—he doesn't think about what he sees. He just reacts.

Education enables a man to draw his own conclusions from what he observes around him. It equips him with sufficient general knowledge to understand the world. It develops in him ability to make rational decisions in difficult circumstances and to meet totally new and unexpected contingencies. Through education he has familiarized himself with the ways in which other people at other times solved similar problems. He is supported by the vast fund of wisdom collected in the past and throughout the world. This sort of education takes much time and effort. It isn't finished when formal schooling ends but goes on all through life.

Mr. CANNON. Mr. Andrews.

Mr. ANDREWS. I would like to ask the admiral what percentage of our roughly 175 million people he thinks would fall under the definition he gave of an educated person.

Admiral RICKOVER. Of course I would include everybody in this room.

Mr. ANDREWS. Present company excepted.

Admiral RICKOVER. It is a good question. I do not think you can ever say that any human being is ever sufficiently educated.

Mr. ANDREWS. The question is, What percentage fall into your definition of an educated person?

Admiral RICKOVER. I could not possibly answer your question for there must be large numbers of people with a good formal education who felt, when they received their college diploma, that they were through with education. For the rest of their lives they never opened a book, never had a stimulating conversation about some basic idea or issue, never even thought a difficult problem through by themselves. Such people I should hesitate to call educated 20 years after they left college.

On the other hand, we are blessed with numerous excellent libraries and nothing educates better than reading a good book and thinking about it. There must be large numbers of people without a good formal education who have self-educated themselves and become genuinely educated persons later in life. I will say this: I doubt that any country has ever had enough well-educated people and certainly no democracy ever has. Authoritarian countries need fewer educated people because decisions are made by a few rulers; but we have to depend entirely on the decisions made by the whole electorate. We can never have too many educated people if our democratic form of government is to work well.

Let me get at this question from the opposite side. How many truly uneducated people do we have? We have about 3 percent illiterates, but our definition of illiteracy is so lenient that it excludes large numbers who may know the letters of the alphabet and recognize simple words but who cannot read a relatively simple paragraph and really understand what it says. It is estimated that we have about 10 percent who are functionally illiterate in this fashion. A number of studies have been made using army records during World War II and the Korean war—such as "The Ineffective Soldier" and "The Uneducated," by Eli Ginzberg. These show that we lost the services

of a substantial number of young men because of their educational deficiencies. In contrast, more than 60 years ago, Germany abandoned official illiteracy statistics because she found that only one-fourth of 1 percent of her army recruits were illiterate. Our illiteracy and functional illiteracy rates are higher than those of many advanced nations.

We are also as a people not given to reading books. In many other countries, including Russia, people read far more than we. We publish per capita fewer serious books than most other advanced nations. I should call people uneducated if they never read a book and depend entirely on the mass media for intellectual stimulation. I fear that we have more such people than we can really afford to have. Our schools have not, in my opinion, educated our people properly. I do not see why we should have more illiterates than other countries.

Mr. THOMAS. That is true of Japan, too.

Admiral RICKOVER. Yes. Japan has very few—less than 1 percent I believe. We are not as good as some of our educationists would lead us to believe.

To get back to your question of how many people are truly educated in this country, I think you are asking me an impossible question.

Mr. PILLION. Admiral Rickover, in your tour of Russian secondary schools, how many archery courses, swimming pools, golf courses, theaters, and superb gymnasiums such as we find in our schools, did you find in the secondary schools of Russia?

Admiral RICKOVER. The schools are very austere. They have no administrators. They have physical education. They do that very strongly, again as is done in Western Europe, but there is no organized athletics. The nearest swimming pool is the river. They have no public relations staff. They have no administrative staff. Everybody teaches. The schools are small and they are cheap to construct. There are no archery courses, golf courses, and other superb facilities not required for real education. I searched far and wide and did not find a single drum majorette. Apparently, they are more interested in developing heads than legs.

Basically a school is a teacher surrounded by a group of pupils. It makes no difference whether it is in a barn or in an ornate schoolhouse. In fact, I would prefer austere surroundings; this prevents diversions from the basic problem.

SOCIAL PROGRAMS IN SCHOOLS

Mr. PILLION. Is it not time, Admiral, that we differentiated between educational institutions and social institutions? Our educational system now aims to take the child from the time it is born until the adult dies, with prenursery courses and with adult education. Are they not attempting now to carry on a vast social program rather than an educational program?

Admiral RICKOVER. Yes, sir. The schools are trying to do everything, and so they do nothing well. As I have said many times this morning, they are trying to perform the functions of the church and the home, in addition to those of the school. We should not use taxpayers' money for such purposes. It has been estimated there are

somewhere between 200,000 and 300,000 teachers in the United States who are engaged in teaching frill and fun subjects. Here again is an opportunity for effecting large savings in our school system, and using the money for real educational purposes.

Mr. PILLION. This reminds me of New York State, where they were recently paying State aid to teach mahjong in the night schools, a great project.

Mr. YATES. The Russians have one of the strongest basketball teams in international competition. If they do not have sports on the local level, how do they select the teams that do participate in international competition?

Admiral RICKOVER. I do not believe they have them in schools. They do have them in factories and other organizations, but they do not permit anything to interfere with the primary function of their schools, which is to develop the mind.

Mr. YATES. None of these teams play in the schools themselves?

Admiral RICKOVER. Not so far as I know, sir. The schools are for studying and learning, to train the mind.

EMPHASIS NEEDED ON EDUCATION

Mr. GARY. Admiral, do I correctly understand that what you are advocating is that we give more attention to education in this country than we do to other activities such as housing and roads?

Admiral RICKOVER. Yes, sir. It is my considered opinion that there is no problem that faces the Congress or the country that is as important. I would add a political note to this. Several months ago there was a poll to find out what interested people most. Naturally, the No. 1 interest was their health. That is obvious. But second, they were interested in education. I have been very much surprised that Members of Congress have not recognized this and made greater use of education in political campaigns. I believe that education is definitely the most important problem facing our country. I know of nothing of greater importance. Because if we do not solve our educational problem, we will not be able to solve the many other problems that face us.

Mr. GARY. We cannot spend our money on the frills, and keep ahead of Russia with their austere program. Is that not correct?

Admiral RICKOVER. It is not entirely a case of spending money, sir. It is a case that time is more precious than money. We have a certain number of students. We are wasting their time. It is not money alone. We are rich enough and we have enough money in this country to get along on, and whenever we run out of money, people go to Mr. Cannon and, in his great generosity, he appropriates more. It is not entirely money.

RATE OF EDUCATION INCREASE IN UNITED STATES AND IN RUSSIA

Mr. FENTON. Admiral, according to your definition of a well-educated person, what is your opinion as to whether or not there are more educated people in Russia than in America?

Admiral RICKOVER. I believe today Russia has more educated scientists and engineers than we. In other disciplines they do not yet have as many. For doing a job connected with war, which is the great danger that faces us, I believe they are better educated now.

I am not talking about present industrial strength. Allan Dulles, Director of our Central Intelligence Agency, recently said that they have been increasing their industrial productivity 9½ percent a year for the last 10 years, while we have been increasing ours at the rate of about 3.6 percent. This means that within 10 to 15 years the production curves will cross. It does not mean they will be stronger than we industrially, because we have vast industrial organizations and factories which are far superior to the Russians'. But the thing which is of decisive interest is the rate of progress.

In education their rate is increasing at 6 to 7 percent a year; ours at 3 to 4 percent. This is the real problem. It is not the actual amount; it is the rate. And their rate of increase is greatly superior to ours. What is happening today was determined by what people did about 15 years ago. What will happen in our country 10 to 15 years from now will depend on the wisdom we display today. That is why the rate of education is so important.

We must not permit anyone else to have a higher rate of education than we. It could lead to great national danger. Russia has a standard of living about one-third that of ours. Yet in terms of their national product they devote more than twice what we do to education. So, all factors considered, the support they give to education represents a national effort several times as great as ours.

Mr. FENTON. Did you make any particular observations concerning the medical profession in Russia?

Admiral RICKOVER. I did not, sir. I only know that one of the things Russians are proud of is that all medical care is free. But it is something like housing. It is not what we would consider first-rate medical care; still it is better than it used to be. Housing in Russia is also almost free; that is, it is extremely inexpensive. But it is pretty poor housing by our standards, and few can really choose where they live. Mr. Khrushchev makes quite a point of the Russian citizen's right to demand better housing from the local council if he feels he does not get all the housing he is legally entitled to. Sure, he can make his demand. He can make it as often as he wants. There is nothing to stop him. But, he will go on living in about 5 square meters, several persons to one room. The housing situation is improving, but today it is definitely not what we would consider anywhere near adequate.

Mr. CANNON. Mr. Rabaut.

NEGLECT OF FOREIGN LANGUAGE TEACHING

Mr. RABAUT. Admiral, how do you account for the great interest in languages in foreign countries as compared to the interest in languages in the United States?

Admiral RICKOVER. You know, sir, that the interest in foreign languages in Western Europe is not a new phenomenon. It has existed for a long time. One reason is that they have so many different peoples with diverse languages all around them. The Russians know that if they are to become a great world power they must have many citizens who know foreign languages. They must if they are to influence other people in international relations, and in their political ideology, and you well know what they are doing in these areas.

Mr. RABAUT. Are we quite lacking in that here?

Admiral RICKOVER. Yes, sir; we are very much lacking in that area. About 10 million Russians are studying English, and only several thousand Americans are studying Russian, as I mentioned before. You know very well what the statistics are about our representatives to foreign countries, that few of them can speak the language of the people they are accredited to. For example, of our entire party, there was only one man, the interpreter, who could speak Russian, but we found many Russians who could speak English.

Progressive education must be blamed in large part for our neglect of foreign language teaching. Kilpatrick's biographer, for example, quotes this greatest living disciple of progressive education as saying that he believed—

> for the average student it was a great waste of time. In terms of rich, vital interests that might lead to individual growth, languages offer meager possibilities.

The same biographer reports with apparent approval that he had seen—

> a class of 600 and more graduate students in education, comprising teachers, principals, superintendents, vote their opinion in overwhelming numbers that Greek, Latin, and mathematics offered the least likely possibilities for educational growth; and with almost the same unanimity they placed dancing, dramatics, and doll playing high on the list in this regard.

I do not wish to get into a discussion of the value of a classical education except to say that I would regard it as definitely somewhat more informative and more conducive to developing the intellect than dancing, dramatics, or doll playing. And to think that we permit men with views such as these to dominate our educational system; that we turn our children over to them.

We are the only major country which neglects the early years when a child can learn foreign languages most easily—from 10 onward. As with all solid subjects, we defer learning foreign languages to the late teens, in order to avoid separating children who wish to pursue a college-preparatory course of study from those choosing vocational training. This is held to be more democratic.

Mr. CANNON. Mr. Jensen.

Mr. JENSEN. Admiral, we have talked a lot about education. Of course we are all very much for education as such. Washington and Franklin had very limited formal education, but they had wisdom. You cannot always attain wisdom through education. It takes the will, it takes the gray matter, to bring about wisdom.

Admiral RICKOVER. You are born with a certain amount of gray matter, but you learn to use it to best effect through hard study—this is what education does for you. Unlettered intelligence can at times be dangerous.

Mr. JENSEN. There is a difference between education and wisdom. Our country would have been in a terrible plight had not we had great statesmen who were wise in their decisions.

Mr. YATES. Will the gentleman yield? As it happens, the founders of our country were among the most literate and educated people in the history of the world.

PRIMARY REASONS AND PURPOSES OF AN EDUCATION

Mr. JENSEN. I have just one more question. Do you agree that one of the primary reasons and purposes of an education is to teach people to govern themselves?

Admiral RICKOVER. Yes, sir; but that is not its entire purpose. I have thought about this a great deal, sir. To my mind, education is a process of developing the intellect. It will have many good side effects. For example, knowledge tends to make some people more tolerant. We say that to know all is to forgive all. Nobody is more apt to be intolerant than the ignorant. The process of acquiring an education requires application and effort—this tends to teach us that nothing valuable is acquired without hard work and that it is advantageous to work hard. Education tends to give one a sense of humility, for if one absorbs basic knowledge in the process, he also finds out how vast is all knowledge and how little he actually knows. Scientific and mathematical education teaches respect for facts and the ability to accept the truth even if it means one has to admit being in error; it lessens one's tendency to dogmatism.

Almost all dogmatic people are ignorant or they would not be so absolutely certain they were right. I do not believe that education will necessarily teach a person self-discipline. However, I heartily agree with you that education is needed in a democracy because an uneducated people will not govern itself wisely. Today the citizen in a democracy must decide complicated matters, and unless he is educated, he will not decide them intelligently.

But education has a great many other values. In a totalitarian society it simply makes people better at their various jobs. There, education actually may have a side effect the totalitarian rulers don't want. It may make the people more critical of their government. In a democracy education is good for the individual and good for society—it is 100 percent good in every way. Just because some educated societies have gone wrong is no argument for or against education. Education is a tool; it depends upon the particular society whether this tool is used for good or not. In a democracy it will always be good for the whole of society.

Mr. JENSEN. It is to teach us to govern overselves. My question is, Why should we have government dictate our educational program?

Admiral RICKOVER. We should not have government dictate our educational program. I have never advocated that, sir.

Mr. CANNON. Mr. Preston.

EDUCATION OF TOP STUDENTS FROM UNDERDEVELOPED COUNTRIES IN THIS COUNTRY

Mr. PRESTON. Admiral Rickover, recently a very prominent businessman and a naval officer jointly made the suggestion to me that Congress pass an act enabling us to bring to this country obviously brilliant students from underdeveloped countries and provide them with our best technical education, and undertake to keep them in the country for whatever worth they might be to us. What do you think of this suggestion?

Admiral RICKOVER. I would particularly try to apply it to the Russians. I think any Russians you bring over to this country—whether they are members of the Communist Party, whether they are students, or any other type of people—if you brought them over here and they saw what this country really is, if they saw what sort of people we are, what our institutions are, they could realize that many of the things they have been told about us are not correct, and they would be

bound to have doubts. I think it is a good idea for us to educate foreigners.

Mr. PRESTON. This suggestion dealt with a very selective proposition with a view toward integrating them in our country as permanent residents, to utilize their unique brainpower.

Admiral RICKOVER. I doubt very much that you would get many people from backward countries who could help us in a short time. We have been helped by people who have come here from the more advanced countries, but I think you will find few cases, if any, where people from backward countries have come over here and have contributed. We have plenty of intelligent and potentially capable people of our own; all they need is to be given a proper education. We graduate many people from college, but only a few are really able to do the important work that advances us technologically or moves us forward toward a higher civilization. We must have an educational system that discovers potential first-rate minds at an early age and then educates them to the highest degree possible. We need a large pool of well educated people from whom will come the ones who move our country forward. The rest will be better and happier people for having been well educated and they will do their work the better for it. We may need only a few genuiuses, but we also need many well qualified professional people and leaders in government, industry, and the arts.

Mr. FOGARTY. Admiral, how do you account for so many bond issues being voted down in various cities, when some of their schools have double sessions, sometimes by as much as 2 to 1?

Admiral RICKOVER. Contempt for education, a lack of understanding of what education is and can do, a failure in responsibility to our children, and a selfish attitude by grownups where they are more interested in acquiring material things than in developing the minds of our youth and taking care of the future of our country. There are many schools in this country where the boys and girls drive up in expensive cars but have to go double shift in the school.

Mr. FOGARTY. The response I usually get is that "My taxes will be raised."

Admiral RICKOVER. Certainly. It all depends on what you want out of life, sir. If you think that having two or three cars and a new TV set every year is worth more than what goes on in your children's minds, that is what you do and that is what many of us are doing. Some parents consider it more desirable that their children have cars while they are going to school than to acquire a good education. Apparently a child's social status is supposed to be improved by having his own car. A recent study showed that there is a direct relation between a high school boy owning a car and the marks he makes at school. Those who have the cars do the poorest.

EDUCATIONAL SYSTEM AT THE SERVICE ACADEMIES

Mr. CANNON. Admiral Rickover, what are your views on the educational system of our service academies—Annapolis, West Point, and the Air Force Academy?

Admiral RICKOVER. I can only talk with familiarity about the Naval Academy, but I am sure what I say about the Naval Academy would apply to the others.

Mr. CANNON. You are a graduate of the Naval Academy.

Admiral RICKOVER. Yes, sir. I am a product of our military education system, plus 40 years of studying and reading cultural, scientific, and engineering matters and thinking about them every spare moment I have. My great regret is that my work does not permit me to do more. Any man who thinks he can go to college for 4 years and considers his education completed is deluding himself.

In 4 years of college—let us say engineering college—a man puts in perhaps 75 classroom hours on a technical subject such as electrical or mechanical engineering. This does not make him an engineer. He has merely been exposed to some engineering fundamentals. It takes a good many additional years of self-education, experience and drudgery before he is a really qualified engineer.

I shall confine myself to the Naval Academy, if I may.

The midshipmen who graduate from the Naval Academy are about 2 years behind graduates of our good engineering schools. The reason is that a good deal of their time is taken up with training and not with education. Some of their time is also taken up with self-policing. Many midshipmen spend hours walking up and down the dormitory corridors checking up on their comrades. A student who wants to work after 10 o'clock, is not allowed to do so.

Now, Naval Reserve officers from other schools—Yale, Princeton or Harvard—are permitted to study at all times and as many hours as they want, but not students who go to the Naval Academy. A midshipman, for example, finds it practically impossible to use the library except for short periods on weekends. If you go to any civilian college you will find the libraries in use until late at night every day of the week.

Naval education aims to develop officers with a high standard of professional competence. At least this is the ostensible aim of naval education. But over many years I have been observing the attitudes and mental habits of a great many naval officers. I have come to the conclusion that our naval education program does not develop or even encourage the kind of professionalism which is absolutely necessary if we are to build and maintain an officer corps capable of meeting the challenge of nuclear power and of the coming space age. It does not prepare them adequately for the problems which arise as technology advances. To be a good naval officer a man must be as much a professional person as a physician. And this he is not.

I am deeply concerned over the fact that the majority of young officers lack the attitudes and standards which characterize a professional person. I would sum these up as continuous self-education to keep abreast of new developments, and ability for independent judgment in matters involving technical competence.

Over the last 12 years I have interviewed more than a thousand officers in order to recommend those who had the necessary abilities and motivation required for duty in nuclear-powered ships. My conviction that something is lacking in their naval education grew slowly and as a direct result of these talks. What I was looking for is exactly what will normally be expected of all naval officers when we eventually have many nuclear-powered ships.

Nearly all the candidates I talked with were well above the average in intelligence and performance, having been previously selected to become candidates for the nuclear program. So in a sense they were

an elite group. Yet I found among this select group that the great majority did not have a professional attitude; that in their thinking, their attitude toward their work and their mental habits, these officers resembled technicians.

As I see it, a professional person differs from a technician by reason of his broad general education, his mastery of a specific area of higher learning and his ability to apply this specialized knowledge to practical problems. He applies to his work a broad base of knowledge and a habit of independent and logical thought. He sees the problems he meets in his work in their proper setting and solves them by applying his professional and general knowledge individually to each problem. He uses his mind afresh for each of these problems—none are pure routine.

The technician's work differs from that of the professional man chiefly in that it is largely routine. He has not been trained to solve every problem individually. His education has generally been much too limited to do this. The difference between him and the professional man is a difference in education, motivation, and outlook. The technician has been trained to do his specific kind of routine work; the professional man has been educated to handle unforeseen situations requiring new solutions which involve ability to translate concrete problems into abstract principles and abstract principles back to the solution of concrete problems. The officer is or ought to be a member of a profession.

Many of the officers I have talked with have been devoting their energies almost entirely to the practical and material problems of their job, and they go on year after year with hardly an hour spent in increasing their basic education and maintaining intellectual interests in fields such as mathematics, science, and history, without which they are really no more than technicians.

Apparently the young graduate of the Naval Academy believes that the formal or theoretical phase of his education is over and that his task from that point on is merely to apply, in a largely routine manner, what he has learned of the trade of a naval officer.

This attitude of young naval officers contrasts markedly with the mental outlook of young civilian graduates of scientific and engineering colleges. I know many of these civilians who are no more intelligent or better educated than naval officers of the same age, yet who clearly recognize the necessity of devoting many hours of their free time to continue education and self-development. They fully understand how important for their daily work and for their professional standing it is to continue their program of development and broadening in fundamentals.

As I talk to older officers—executives and commanding officers of ships—it becomes clear to me why many young officers do not maintain professional attitudes after graduation; why they quickly and almost completely abandon all further study when they come aboard a ship or naval station. They are conditioned to follow the lead of their superior officers and these do not themselves set them an example in professionalism. Indeed, the superior officers do not even seem to realize the necessity of holding their officers to professional standards. What they do require of their officers is a high standard in the day-to-day operations of the ship and its equipment and in the handling of men. They judge officers almost entirely by their competence in these respects.

It is little understood that essentially the operating of a ship and the handling of men and equipment are routine tasks—tasks that a well-trained technician could handle. That officers handle them better than enlisted men is, of course, merely a consequence of the fact that officers have received longer and more intensive training in this field. Beyond requiring officers to perform these essentially routine tasks and to perform them excellently, superior officers rarely demand any strictly professional competence of the younger officers. Seldom do they encourage these young officers to continue their general and professional studies. Except for those who go on to postgraduate school, the education and development of the naval officer's specific professional competence is presumed to have been completed in 4 years at the Naval Academy or at college.

The constant intellectual development of the naval officer's mind is a necessity if he is to be able to handle in an imaginative and creative manner the increasing responsibilities which will be his with time. The practical skills which many of these officers have acquired tend to mask the stagnation of their intellectual level. This is only revealed when they are put into top positions where outstanding leadership and insight are required to guide the Navy through the innumerable unforeseen problems of these rapidly changing times.

The blame for much of this attitude must be put on the Naval Academy itself. Though the Navy draws its officers from many colleges besides the Naval Academy, they nearly all follow the example of the senior officers, most of whom reflect attitudes acquired at the Naval Academy. Those attitudes are developed by a system that places before the talented student little challenge or opportunity for extra work. With few exceptions he takes the same courses and is encouraged to do little more than the least gifted in the class. So much time and attention is devoted to the practical skills that not enough is left to devote to the awakening of the mind. This is a serious imbalance. Only to the extent that they develop the capacity of the mind to understand what is going on in science and in the world will officers be able to make correct decisions when they reach high rank in later years.

Every sign I read indicates that the future will require of our military leaders more sound and penetrating thought than was needed in any past period. The routine performance in top positions we all too often witness will not get us by much longer. What I want to stress is that an intellectual approach cannot be created overnight—it must grow out of the efforts of officers from the start of their careers to make the best possible use of their time and their minds. This will come about only if senior officers understand the importance of such a professional outlook on the part of their juniors and do something to encourage and reward it.

I have two recommendations to improve the situation which I have described. The first is that steps be taken to call the attention of all commanding officers of the need to encourage a professional point of view among their officers. It should be every bit as much a requirement of command to do this as it is to maintain a ship and crew in fighting trim and to keep the administrative records in order. Inspections of commands by senior officers stress these latter points; the efforts of the command toward encouraging mental development of its officers, which is the more important, is not inquired into. As

a part of the action which I recommend on this point I would suggest that seniors and inspecting groups be required to rate a ship or a command on its performance in the area of intellectual leadership as well as in that of the more technical and routine aspects of its mission. Also, specific notice of a commanding officer's success or otherwise in this regard should be taken in reports about his own performance.

My second recommendation is for a sharp change in the objectives and the curriculum of the Naval Academy. The objective of the Academy, as with colleges in general, should be to provide an opportunity for the student to advance at the fastest rate of which he is capable. Maximum encouragement should be given to the talented student and he should be urged to attempt more and to work just as hard as the slowest individual has to. Today the best students at the Academy often find it so easy that their time is wasted. Worse than this, the Navy is then denied the benefit to be derived from the greater potentiality of gifted persons. At present this potentiality is not realized because a single standard of performance is deeply rooted in the Academy philosophy.

To make this change it will be necessary greatly to reduce the time devoted to the purely naval subjects such as seamanship and ordnance and to put more emphasis on the liberal arts. Also the close ordering of students' time and suppression of individuality in intellectual development may make some sense from the point of view of training, but for the purposes of encouraging originality of thought and imagination it is wrong. I consider that the purely military features of the officer's training should be reserved for a period of, say, 1 year after completion of the undergraduate study. This should then be followed by sea duty in the normal fashion. In this way the young officer would first learn how to think for himself to the limits of which he is capable; learning the military aspects and the technical skills in themselves will do little to encourage the intellectual approach which I advocate.

I believe that the problem which I have just stated is perhaps the most important one facing the Navy as well as the Army and Air Force today. Our top officers are continuously called upon to make technical and administrative decisions which will have an important effect on the future of their service and our country. To insure that the greatest number of those future decisions are wise and correct, no surer investment of time and effort can be made today than encouraging our officers to broaden their knowledge and their ability to think and to pass that encouragement on to those who serve under them.

Another thing that bothers me very much is that the service Academies still keep on with the immature kind of hazing that used to be prevalent in the private boarding schools of England. The Academies, however, are not secondary schools, but colleges. Hazing is the sort of thing which immature boys enjoy. To carry it into a professional school perpetuates immaturity when what we need above all in the military services is officers who are mature men. There is now some recognition that this perpetuates adolescence and some attempts are being made to change this juvenile nonsense. But I fear little will be accomplished unless Congress gives help in this matter. It can do so through its membership on the Board of Visitors, and through its power over appropriations.

I am sorry that I must say that I consider our naval education inadequate for the needs of the present, and certainly as a preparation for the much greater needs of the future.

Mr. CANNON. Do you think the postgraduate schools in the Navy are helping any?

Admiral RICKOVER. They are generally a help, frequently more so to the naval officer himself, than to the Navy. You will find if you look into the records that the majority of officers rarely are assigned to duty which involves work in the specialties they have studied during their 2- or 3-year postgraduate course.

Most of those who complete the postgraduate work, however, are then better qualified for a job on the outside.

Mr. CANNON. It doesn't help the Navy, though?

Admiral RICKOVER. Not as much as it should or could.

You gentlemen in Congress send some very fine human specimens to these service academies and if the Naval Academy is an example, I do not think we do justice to these fine young men.

In the first place, all a midshipman has to do is get by. That is, the brilliant student is judged by the same standards as the mediocre student. We should require that every midshipman and every cadet at the Air Force Academy and at the Military Academy work very hard, work to his maximum capacity. We should then give him some credit in his class standing for working hard. As is, you send these fine youngsters to the Naval Academy and they get by for 4 years, and in those 4 years' time they develop habits which hurt them for the rest of their lives.

I had some discussions with Senator Saltonstall about this subject 3 months ago when he was one of the Senate Members on the Board of Visitors to the U.S. Naval Academy. I know you also have Members from the House on the Board of Visitors. As a result of his observations he and the other Senate Members submitted a minority report to the Board of Visitors which I would like to include in this record. He advocated that they make changes which would improve the situation.

(The document referred to follows:)

SUPPLMENTARY STATEMENT TO THE 1959 REPORT OF THE BOARD OF VISITORS TO THE U.S. NAVAL ACADEMY SUBMITTED BY SENATORS SALTONSTALL, HOLLAND, BEALL, AND ENGLE, SENATE MEMBERS OF THE BOARD OF VISITORS TO THE NAVAL ACADEMY

We have prepared the attached statement expressing some of the comments which have been suggested to us by responsible persons interested in the Naval Academy.

These views we would like to include as a supplement to the report of the Board of Visitors to the Naval Academy. We would hope the committee appointed to study the curriculum might consider these suggestions in connection with its report to the officials of the Naval Academy and for the benefit of the Board of Visitors.

1. It has been suggested that the present age limitation of entrance to the Naval Academy be lowered even further. It has been demonstrated that the younger students have better scholastic records and are better motivated. We note with approval that the Naval Academy has already adopted the college entrance examination for scholastic entrance requirements, but even more stringent achievement tests might be considered. Some relaxation of rigid physical admission requirements might be considered. These may on occasion exclude otherwise highly qualified candidates.

2. The curriculum has for many years devoted a substantial portion of time to practical courses and drills. It is suggested that a study be made to determine whether some of this time could be more profitably devoted to strengthening the

intellectual capabilities of the midshipmen. Many items of equipment and machinery are used for practical training during the year, much of which can be covered during the summer training thus leaving more opportunity for academic work. Evidence of the need for revision of the curriculum and higher academic standards is shown by the fact that a Naval Academy graduate must take 2 years of additional undergraduate studies in order to compete with his college graduate counterpart in science and engineering graduate fields.

3. It is suggested that increased emphasis should be placed on individual academic achievement by offering additional or optional courses to individuals whose academic attainment is outstanding.

4. It has been suggested that the Academy might find much benefit in making greater use of qualified civilian instructors of professorial rank and less use of line naval officers. It has been suggested that exchange professors from leading engineering and scientific schools might be invited for limited periods at the Academy.

5. It has been suggested that too much of the midshipmen's time is used with routine military and administrative duties and his schedule is so rigid as to preclude added study hours, should an individual student wish to pursue his studies beyond the immediately prescribed course. Greater flexibility in the nonacademic schedule might well permit better individual academic development and encourage initiative and leadership.

Admiral RICKOVER. I would like to observe that for the vitally important job of training future officers we now bring in officer instructors who themselves have had little or no experience in teaching and who merely do a tour of shore duty at the Academy as part of the Navy rotation system. Half the faculty at Annapolis consists of such officers and many of them teach academic subjects. Now and then, you may find one with a natural gift for teaching, but I personally never met one when I was at the Academy.

Here, as an example, is the way officer language instructors are chosen for the Academy: An officer is picked for a tour of teaching Spanish; he did study Spanish for 2 years or so when he was a midshipman. In some cases he might get 2 or 3 months summer school review before starting to teach. In between school years he might be sent to Spain for further brushing up. Rarely will this system produce really effective language teaching. And yet today knowledge of foreign languages is certainly an important item in an officer's education.

I strongly hope and I urge Congress to provide money for engaging more civilian teachers and better ones at the Naval Academy.

Mr. CANNON. The gentleman from Arizona.

RELATIONSHIP BETWEEN EDUCATIONAL SYSTEM AND SOCIETY

Mr. RHODES. Admiral, I gather you admire the Western European system of education.

Admiral RICKOVER. Yes, sir; because we can learn and profit from it.

Mr. RHODES. To me, a system of education should be judged not as an end in itself, but by the type of society it produces. France is part of Western Europe, and I have the greatest amount of admiration for the French people, but France was not for many years, until quite recently, a stable nation, economically, politically, or any other way.

What good is an educational institution which is perhaps in itself excellent, which does not produce any better society than we have in some of the countries of Western Europe?

Admiral RICKOVER. Do you like Switzerland or Holland or Norway? They all have the same educational system as France.

Mr. RHODES. Why does the same educational system produce stability and good economics in one country and not in others?

Admiral RICKOVER. Because education is a tool, as I said before. You can produce a Schweitzer or a Marshal Petain in the same country. You can produce a Hitler or a Thomas Mann in the same country. You can produce a Benedict Arnold and a George Washington, too. You have democratic countries and you have totalitarian states. You have all kinds, despite the fact they have the same educational system.

Democratic Denmark educates its children well and so does totalitarian Russia. The people of Switzerland, Holland, and the Scandinavian countries are even today far more democratic than those of Germany; yet their public school system is quite similar to the German.

Where the schools are primarily concerned with imparting a broad general education they are apt to resemble one another despite different forms of government. It is only when schools concern themselves excessively with behavioral conditioning—as they do here—that the objective of such conditioning becomes intimately tied in with political considerations. Insofar as Russian schools condition the student for life in a totalitarian state, their techniques are obviously wholly inappropriate to our schools. But insofar as they succeed in motivating many times more students than our schools do to acquire a solid knowledge of subjects such as geography, literature, foreign languages, mathematics, and sciences, we might, I think study how they manage to do this.

The thing to learn from the Russians is their ability to produce large quantities of well-informed graduates by age 17. The thing to learn from European schools is their ability to produce secondary school graduates who are intellectually more mature than our high school graduates and who are more broadly educated.

The part you are talking about is the social training, which is the primary responsibility of the church and the home. If you expect the school to take over all those functions, then they cannot do their own job unless the children are there 24 hours a day. What has happened in America is that many parents have abdicated their responsibilities and have let the schools assume them. The progressive educationists have been more than willing to take over these responsibilities. In fact some of them think the schools should be responsible for the "whole child." They say they will produce a "well-rounded" child. I think if our children were more elliptical and not so well rounded, they would be better off. The results show what a poor job they have done, both in education and in the social aspects of training. They have created large numbers of jobs which have no place in tax-supported schools. The use education is put to, as I have said, depends on all of the education and training a child gets, not alone on what he learns at school.

Mr. EVINS. Admiral Rickover, I certainly appreciate receiving the honest report of your observations on the relative status of our own educational system and educational capabilities and those of Russia. We know the old saying that God is on the side of those who have the most soldiers, the most divisions, and the greatest firing power. If I understand your observations properly we must add to that saying the additional phrase: and the greatest brainpower. Is that right?

Admiral RICKOVER. Yes, sir. Today military power depends upon technology and technology depends on educated brainpower. There was a time when a primitive agricultural country, for example, could get by with an almost totally illiterate citizenry, as long as there were a few educated people to run the country and to see that farming was done well enough to feed, clothe, and house the people. There was a time when a country could get by if all workers had only an elementary education and perhaps 10–15 percent of the population had a genuine education, and of these some 5 percent or so became trained professional people. Today, any technologically advanced nation needs large numbers of well-educated specialists, both professional and on the level of the technician. It needs well-educated leaders of all kinds and, if it is a democracy, it must have a citizenry with much more than an elementary education. Large numbers of our high school graduates have not had more than what abroad would be considered but an elementary education. In my opinion our children are entitled to more than that, and they ought to have more if they are to be good and wise democratic citizens.

ADAPTION OF PRINCIPLES OF EDUCATION IN OTHER COUNTRIES TO IMPROVED SYSTEM

Mr. EVINS. As I have listened to your comments, Admiral, it appears that the Russians are taking the lead in well-disciplined education in getting at fundamentals. Our forte has been more along the lines of inculcating initiative and independent thought. Of course, we all appreciate that, for example, a man who can't add or subtract properly is not likely to develop a new system of calculus. But, don't you feel that perhaps our system and our emphasis on initiative, to some extent at least, is a factor to our advantage?

Admiral RICKOVER. I am afraid that I cannot agree with you that our educational system inculcates initiative and independence of thought. In my opinion, it goes in too much for life adjustment, behavioral conditioning, and teaching the child to conform to whatever group he will be identified with in later life. Typewriting, driver training, woodshop, etiquette, baton twirling, flycasting, domestic science, and other know-how subjects, no matter how "useful" they may be, do not, to my mind, inculcate as much initiative and independent thought as does grappling with the basic liberal arts curriculum. Dealing with hard intellectual problems toughens the mind and to that extent develops initiative; learning the basic principles of science teaches one to think in terms of principles and facts, and thus tends to encourage independent thought which is not easily swayed by appeals to social or other conformity.

Mr. EVINS. I am sure, Admiral, that you do not advocate that we copy the Russian methods, but that we modify and improve our own methods to place greater emphasis on giving a solid foundation of basic knowledge in mathematics and science so that we can produce the scientific and engineering skill we need for our own survival.

Admiral RICKOVER. I would not adopt their whole system because I think they indoctrinate their children just about as much as our teachers colleges indoctrinate our teachers. The Russians indoctrinate their children in the benefits of communism. Our teachers colleges indoctrinate our teachers in Dewey's philosophy of education and leave out all other educational philosophies.

As I have stated many, many times, I use the Russian educational system as an object lesson in what children, if properly motivated and skillfully taught, can accomplish as regard mastery of the basic subjects which make one an educated person. As I have also stated frequently, the Russian system of education is a simplified version of the European academic secondary school, differing primarily in that it manages to get a good many more children to absorb academic subjects than any other system. The 10-year school in Russia is not as good as the European academic secondary school—it teaches fewer subjects and lasts only 10 instead of the usual 12 years. It does not reach quite as high achievement levels. But basically, it teaches in a similar manner and the subjects it does teach are also taught in other countries—they are those that make up the liberal arts curriculum. The Russians introduce Communist ideology where they can, but it so happens that there is not much room for ideology when you teach a child to speak French or to solve differential equations. I have stressed many times that I speak only of education and not of what people do later on with their education. I wish to emphasize that democracy of itself does not make up for the disadvantage which an uneducated person suffers when he competes with an educated one—even a small difference in education can swing the pendulum.

I would certainly adopt a number of important principles which are to be found in all advanced western and northern European countries: standards for children, standards for teachers, a much longer school year, simpler school buildings, separate schooling for children of markedly different intellectual abilities and desire for education—we are now belatedly adopting multiple tracks but we are not going far enough in this direction. Multiple tracks are not palatable to those imbued with progressive educational ideas, but under pressure of public demand, such tracks are nevertheless now slowly being established in many schools. I read in a Washington Post editorial recently that the multiple track system adopted in the District of Columbia is the answer to the critics of education.

Now up to the time these critics—and I certainly am one of them—started, most educationists said it was undemocratic to have tracks. They said it would be undemocratic to separate the children in accordance with their ability.

Now that they have begun to adopt the track system they say this is their answer to the critics instead of admitting that this has only been done because of the critics.

The Russian system is unique in the large number of children it educates in basic subjects. It can do so for the most part because education is the only escape hatch from life in very austere circumstances. This, of course, we neither could nor would want to duplicate here. As long as one can make a good living in this country without being genuinely educated, the vast majority of average children will not put out the effort it takes to acquire a real education. But there are things we could do to increase motivation in our children. A realization of the importance of education to the future of this country and to our children would be one such thing. No parent would encourage his child to have a good time at school and not to work hard if he knew that he thereby handicaps both his child and his country 20 years hence.

A realization as to just how poorly we educate our children compared to the way most advanced democracies and Russia educate their children must be thoroughly understood by everybody, parents, Congress, schoolteachers, school boards—by every citizen. This is why I suggest setting national standards by which parents themselves can judge the performance of the local school. I think it might be a good idea for the commission or council I proposed, if it drew up a list of achievements in individual subjects, setting forth first the goals it suggests our schools should aim for, then those achieved in Russia, then those achieved in various other countries whose citizens we respect—England, for example, because of our common heritage; Switzerland because we are the two oldest living democracies; the Scandinavian countries and Holland because they are highly civilized democratic countries whose way of life is pleasant and against whom we have no prejudices of any kind.

Switzerland, in particular, might be well worth our studying. There the highest levels achieved at the university are very high indeed; yet the educational gap between the best and the least educated Swiss is rather small. We might wish to study their army records where we would find that almost no male is rejected for mental or educational deficiencies, and compare this with our own army records. We might wish to examine the general examination which every recruit takes at age 20, and compare it with the achievement levels of our average high school graduates. We might examine the Swiss federal maturity examination—the Eidgenossenschaftliche Abitur—which is prerequisite for the study of medicine and compare it with our college board achievement tests.

If we did all this, I think we might understand why Switzerland, which has only one fifth as much land per capita as we, which has no natural resources at all except scenery, rocks and water, has a per capita income just under that of rich, empty Canada, and holds third place on the world table of income. All I say is that we ought to find out what others achieve educationally so that we may at least do as well as they.

While in the end we must depend on our own ingenuity to meet this education problem, we would do well to learn all we can from countries which have had much longer experience with public education than we. We ought, first of all, to disabuse ourselves of the quaint notion that we were ahead of all the world in providing public education.

BASIS FOR ESTABLISHING TEACHER SALARY SCHEDULES

Mr. LAIRD. It is my understanding that the National Educational Association and other groups have favored giving primary emphasis in teachers' salary-schedules to years of service. Do you think our educational system would be improved if primary consideration in establishing teachers' salary-schedules was placed on merit?

Admiral RICKOVER. With any civil service job, it is difficult to determine merit satisfactorily. Most of our teachers favor present salary schedules because they do not trust the administrative officials who rule our schools to judge them fairly and competently. Ours is the only school system where nonteachers often run the schools. As you are aware many of our schools are run by principals who were athletic coaches. In one State I believe 60 percent of the principals

were athletic coaches. Individual merit may therefore be too difficult to ascertain fairly and in a manner which would not disrupt teacher morale.

I would suggest we learn from the European system which combines three factors in the salary scale—education, actual teaching assignment, and seniority. Roughly, teachers are of three kinds—elementary, lower grade secondary, and upper grade secondary. In some countries there are only two kinds—elementary and secondary. Salaries are higher with the more education and knowledge that are required of the teacher; hence the pay is higher for secondary than for elementary teachers. Seniority is certainly one valid salary criterion because practice should increase teaching ability. I would suggest that we aim at having teachers in the 3 last years of high school who have had the equivalent of a first-rate legal education; that would be a B.A. plus 3 years postgraduate study in their chosen subjects. Elementary teachers would need somewhat less knowledge of subject matter and more of pedagogy. All teachers need some special instruction in pedagogy and a good deal of practice teaching. We might consider copying the internship in education which is common abroad—teacher candidates practicing under the supervision of experienced teachers before they take on a class all by themselves.

PROGRAMS NEEDED TO IMPROVE SCHOOLS IN UNITED STATES

Mr. CONTE. Admiral Rickover, as a result of your observations of the Soviet educational system and that of the United States in comparison to it, do you feel that we should inaugurate sharply increased programs of Federal aid to many types of educational institutions in the United States, or do you feel that primary emphasis should be placed on tightening up of curriculums in American schools and colleges, more emphasis on basic type courses, higher teaching standards, and a more advanced level of work from our students?

Admiral RICKOVER. I should think that what we need first of all is national standards for the high school diploma and for teachers. Second, scholarship aid to talented poor children. Third, Federal equalization funds to help the poorer States provide as good an education as the richer States are able to provide, so that we will eventually have true regional democracy in education. At the present time, I believe this is all that could be achieved. Once we had this much accomplished, we might be able to move into other areas. But I believe the single most important thing that needs to be done is creation of a body to set national standards. We ought to have some Federal label to go to those who meet these standards, too. Education certainly deserves rewards no less than any other human activity; to call reward for educational excellence undemocratic, as many progressive educationists do, is pure nonsense.

Mr. WEAVER. If the purpose of education is to make people think for themselves, and the Russian system is so far superior to our own, why is it that they all come out Communists?

Admiral RICKOVER. So far the Russian Government has permitted their children to think independently only within carefully circumscribed nonpolitical areas. It is my own hope, and that of others who have studied their system, that in time educated Russians will extend their independent thinking to the political sphere and that they will

then be able to bring about changes in the political system. Unfortunately, we know from experience that education of itself does not always give men the courage of their convictions, if they live under a system where to express one's opinion may cost one his head or at least a good job. The paradox is that the more educated we are, the better does our system of government function, yet we are not doing all that is possible to become educated. On the other hand, the more educated the Russians are, the more the present regime is internally subjected to criticism, no matter how strong it may become externally; yet the Russians are doing all they can to get as many of their children as possible through the 10-year school.

So far they have been able to avert consequences detrimental to the present regime, chiefly, I think, by making life pleasant for their brightest young people. Every Russian child showing any sort of promise is pushed through their best education and, when he graduates from the unversity, he is given pay and status so vastly superior to the rest of Russian humanity that he would have to be saint to throw it all away for the sake of his innermost convictions. Russia is a class society. It is a society largely based on intellectual competence in the fields considered important by the state. For those who excel the rewards seem to be great enough to keep them in line.

Mr. WEAVER. By standardizing all education from the Federal level wouldn't we be killing the chances for independent or incentive thinking?

Admiral RICKOVER. I am afraid I don't see the connection. If we set a standard of intellectual achievement that anyone can choose to accept or to reject at will we merely give honest labeling to academic diplomas. Independent thinking is not hampered by requiring that a person know something about the subject he is thinking about. It is not hampered by making a particular diploma reveal exactly what its possessor has learned. Besides, our present educational philosophy does not really encourage independent thinking; it puts too much emphasis on adjustment to the group to encourage such thinking. What it does encourage is the voicing of opinions by young people who are lacking in the knowledge requisite to having a worthwhile opinion. I am old-fashioned enough to feel that one ought to know what one is talking about before he casually voices an opinion.

IMPROVEMENT OF THE OFFICE OF EDUCATION

Mr. FOGARTY. As one with a long and deep interest in the fields of health and education, I have been most interested in this discussion and would like to follow up on your criticism of the Office of Education. I have the honor of being chairman of the subcommittee that passes on the annual appropriations for that Office. To indicate my feeling, and the feeling of the majority of this committee, about the Office of Education, I will quote from the committee's report, which I submitted, on the Labor—HEW appropriation bill for the fiscal year 1956. The pertinent part is as follows:

> The Office of Education always enjoyed a degree of autonomy within the Federal Security Agency, and when the Federal Security Agency was given departmental status as the Department of Health, Education, and Welfare, Congress was assured that it would not result in any change in the status of the Office of Education. In transmitting to the Congress Reorganization Plan No. 1 of 1953,

the President stated, "The plan at the same time assures that the Office of Education and the Public Health Service retain the profession and substantive responsibilities vested by law in those agencies or in their heads." This was further emphasized by the House report on the joint resolution which approved the reorganization plan. That report stated "* * * the plan safeguards the status of the constituent units of the Department, particularly the Public Health Service and the Office of Education. It does not transfer from those agencies any professional or substantive functions vested in them by law, or provide for any such transfer."

There seems to be an attempt now to depart from the policy of lodging in the Commissioner of Education's office, the Federal responsibilities with regard to education. For the first time in an annual budget, the 1956 budget for the Department includes requests, totaling $520,000, for the White House Conference on Education, Cooperative Research in Education, and a National Advisory Committee on Education. Each of these is a separate item from salaries and expenses of the Office of Education, and the National Advisory Committee on Education does not even fall under the overall head "Office of Education." The Commissioner of Education is only an ex officio member, and a nonvoting member, on the National Advisory Committee on Education; or rather he will be if the Committee is actually set up. At the time of the hearings no members had been appointed.

In the opinion of the committee this spreading of the activities and functions of the Federal Government in the field of education can only lead to a further deterioration of the standing of the Office of Education in this country. The committee feels very strongly that we ought to have an Office of Education that is effective, and one that the educational authorities all over the country would have pride in and would look to for leadership and for assistance in their problems.

Admiral, I think you will agree that the Office of Education should be a very important guiding force in the Nation's educational system. In my position as chairman of the subcommittee that passes on their appropriations I feel a responsibility for taking advantage of any opportunity to determine in what ways the Office could be improved. Therefore, I ask you (1) What do you see as the shortcomings of the Office as it is now functioning and how and to what extent could they be corrected under existing legislative authority? (2) What additional legislative authority would be desirable in order that the shortcomings might fully be corrected?

Admiral RICKOVER. It is my understanding that the Office of Education is chiefly an agency for the collection and dissemination of educational information. In that capacity it has, in my opinion, fallen down on the job of alerting this country to the Russian educational menace. It does not in general keep us informed on what happens in education elsewhere, especially in countries whose civilization is similar to ours. Its personnel appears to be oriented toward the system of education advocated by John Dewey and called progressive education and which our educationists have adopted during the past 40 years; no other educational philosophy is taught in our teacher's colleges. I would presume that perhaps what the Greeks did and the Romans did and what the church did in the Middle Ages and what was done during and after the Renaissance, and what all other enlightened countries have done has relevance and lessons for us. But we have thrown all that overboard. We have discarded much of the heritage of Western civilization.

I consider the progressive system most harmful in that it does not truly educate our children. A Federal office ought not, in my opinion, reflect only one eductional philosophy, particularly one which has been in use for only 40 years and which is not used by any other industrial society except ours. I believe the Office tends to reflect the views of the National Education Association and that there may

be too close liaison between the two. As to the views of the National Education association on American education, I notice a recent statement coming from that organization to the effect that critics of American education are like woodpeckers boring into trees and thus destroying them. I do not agree with their claims that American education is the best in the world, that we cannot learn from the educational practices of other countries, and that only teacher and nonteaching members of educational officialdom including their public relations staffs, are qualified to speak on education.

I consider the pamphlet put out by the Office of Education, entitled "Life Adjustment for Every American Youth," the most anti-intellectual document I have read in a long time. I showed it to several foreign educators with whom I have discussed American education and they share my view. The pamphlet reflects National Education Association doctrine. The Office of Education—like the National Education Association—keeps on trying to perpetuate the illusion that ours are the best schools in the world and that only we try to educate all our children. It keeps on equating the college-preparatory course in our high school with the European academic secondary school, which I consider erroneous.

To my mind, it is not further legislation but a change of attitude on the part of the persons in the Office which alone could make of it the effective agency it ought to be. I confess that I would not know how Congress alone could bring this about.

However, it seems to me that the Office should keep careful records of foreign educational systems, giving the curriculums of their schools, the achievement levels at different stages of schooling, the subjects expected of children in their major examinations. I think it should obtain and translate foreign textbooks. Perhaps it could eventually penetrate the diversity of American degrees so that we could get a clear picture of who studies what in this country; how many bachelor of arts degrees are given for learning how to embalm, how to arrange window displays, how to manage a trailer park, and how many for a real liberal arts education. It could compile comparative statistics on teacher qualifications in different countries.

All this would help us get a better estimate of what we are accomplishing in our schools. At present little of the kind is being done. Yet foreign ministries of education and school authorities are only too glad to supply information. I am constantly touched by the great interest foreign teachers have in what I have to say about education; how concerned they are about our educational system; the many offers of help I receive from them; the vast amount of material they send me. Right now I am collecting material on maturity examinations abroad. I have the information for Holland and England, and I am expecting it for Switzerland and Poland. Unfortunately, I have very little leisure time and not enough money to have these things translated at my own expense. I get help in this occasionally, including translations by volunteers. But an agency such as the Office of Education with its large paid staff could do all this much better.

It seems to me that if educational tasks are being entrusted to outside bodies, this is evidence that the Office has not won universal recognition for its work. It is, in the final analysis, up to them to justify their existence and their appropriations by what they accomplish.

Mr. CANNON. Gentlemen, I regret that we must close. The House is convening.

Admiral Rickover, we are deeply grateful to you. We deeply appreciate not only your service to the Nation and the Navy, but we especially appreciate the frankness of your discussion here with us today.

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